

**The Association Between School Choice and Racial/Ethnic Test Score Gaps at the District Level**

by

**Lorraine Reese Blatt**

BA, Grinnell College, 2014

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This thesis was presented

by

**Lorraine Reese Blatt**

It was defended on

June 6, 2019

and approved by

Dr. Heather Bachman, Associate Professor, Department of Psychology

Dr. Francis A. Pearman, Assistant Professor, Center for Urban Education

Thesis Advisor: Dr. Elizabeth Votruba-Drzal, Professor, Department of Psychology

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Lorraine Reese Blatt, MS

University of Pittsburgh, 2019

The rapid expansion of charter and magnet schools is restructuring public education in the United States. Most school choice research examines the implications of choice on a localized level and the findings are mixed; in some districts, school choice improves education equity while in others it intensifies inequity. Varied findings at the local level warrant macro-level research to understand broader trends in the relationship between school choice and achievement disparities. This study examines associations between district-level charter and magnet school enrollment and white-black and white-Hispanic test score gaps from 2008-09 to 2014-15 in third through eighth grade using data from the Stanford Education Data Archive (Reardon et al., 2018) and the U.S. Department of Education's Common Core of Data (2017). This study also examines the indirect effects of district-level white-black and white-Hispanic segregation on these associations. The most robust findings indicate that district-level charter school enrollment is associated with larger white-black test score gaps and this effect is mediated by white-black segregation. The findings also suggest that there is a significant association between magnet school enrollment and larger white-Hispanic test score gaps at the district level, but this association is not mediated by white-Hispanic segregation. Overall, this study provides critical information about macro-level associations between school choice, segregation, and test score gaps and suggests that the expansion of school choice may have negative implications for structural education equity.

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## 1.0 Introduction

School choice is restructuring public education in the United States in the form of open enrollment, means tested vouchers, magnet schools, and charter schools. Magnet and charter schools in particular have expanded rapidly. Between 2001 and 2015, the number of public school students in the U.S. attending a magnet or charter school more than tripled (NCES, 2017). As of 2015, over 2.6 and 2.7 million public school students attended magnet and charter schools, respectively, together comprising over ten percent of all public school students in the U.S. (NCES, 2017). In many districts, magnet and charter schools encompass a significant proportion of the available public schools. For example, Los Angeles, Miami-Dade, and Houston school districts all have over 100 magnet schools (Polikoff & Hardaway, 2017) and in Washington D.C., Detroit, and New Orleans, charter schools make up more than 40 percent of public school enrollment (Almond, 2012).

Magnet schools typically offer specialized curriculum in addition to promoting voluntary integration by enrolling students from multiple catchment areas within or across school districts (Mickelson, Bottia, & Southworth, 2013). The missions of charter schools vary widely; some serve as lab schools to test innovative and novel teaching pedagogies, while others primarily aim to increase competition in public education markets, which is hypothesized to incentivize public school improvement (Mickelson, Bottia, & Southworth, 2013)<sup>1</sup>. There is a surfeit of research examining the efficacy of magnet and charter elementary and middle schools that primarily

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<sup>1</sup> Charter schools exist online in addition to brick and mortar schools; for the purposes of this study, only brick and mortar charter schools are discussed and examined.

compares the academic performance of school choice students to the performance of traditional public school students in the same catchment areas (Bifulco, Cobb, & Bell, 2009; Clark et al., 2015; Hoxby & Rockoff, 2005). This research is largely conducted at the local level and yields very mixed findings, which is likely due to the large amount of heterogeneity in school choice landscapes across different contexts.

While local school choice research provides important contributions to the evaluation of school choice, it does not provide evidence on how school choice impacts more macro patterns of district-level academic performance disparities. In other words, learning that students perform better or worse when they attend magnet or charter schools does not provide insight into how district-level academic performance is affected by the presence of magnet and charter schools overall. Additionally, looking between schools within a district does little to advance a broader understanding of what contributes to education inequity given that most of what explains variance in racial/ethnic achievement disparities occurs between rather than within districts (Reardon, Kalogrides, & Shores, 2018). Thus, in order to fully address questions about associations between school choice and education equity, research must look across districts.

Education equity remains a critical issue in the U.S. Despite the general decline in racial/ethnic test score gaps since 1940, from 1990 to 2000 both white-black and white-Hispanic test score gaps widened or stabilized (Lee, 2002). As of the 2014-15 school year, black students in third through eighth grade scored an average of 1.7 standard deviations below white students on state standardized math and English language arts tests and Hispanic students scored between 1.2 and 1.4 standard deviations below white students on math and English language arts tests, respectively (author calculations from the Stanford Education Data Archive (Reardon et al.,

2018)). Robust test score gaps are just one indicator of persistent education inequity, but these gaps are of crucial concern to anyone invested in equitable public education in the U.S.

Test score gaps vary significantly by school district and patterns of racial/ethnic segregation are among the strongest correlates of these gaps (Gagnon & Mattingly, 2018; Reardon, Kalogrides, & Shores, 2018). Evidence finds that school choice directly amplifies segregation across many districts independently of housing and neighborhood segregation (Fiel, 2013; Mathis & Welner, 2016). There are several potential processes through which the segregation of school districts as a result of school choice expansion might have implications for racial/ethnic test score gaps. For example, in many districts, both minoritized and white students enrolled in charter schools attend schools that are more racially/ethnically homogenous than their assigned traditional public schools (Bifulco & Ladd, 2007; Garcia, 2008; Kotok et al., 2017). If the result is access to quality education for minoritized students who would otherwise be enrolled in under-resourced, low-performing neighborhood public schools, then district-level test score gaps may narrow even if the district becomes more racially segregated (Dobbie & Fryer, 2011; Whitehurst et al., 2016). Alternatively, if the expansion of school choice segregates school districts in a way that further concentrates disadvantage in the most under-resourced schools where the enrollment is predominantly students of color, then test score gaps at the district level may widen (Bifulco & Ladd, 2007). Given the competing theoretical possibilities, it is important to understand empirically, at a macro level, whether school choice is associated with test score gaps and whether segregation is an underlying mechanism of the association.

This secondary analysis examines the relationship between charter and magnet school enrollment and racial/ethnic segregation and test score gaps at the district level. It draws charter school enrollment, segregation, test score gaps, and other district characteristics from the Stanford

Education Data Archive (Reardon et al., 2018) and merges this data with magnet school enrollment data from the U.S. Department of Education's Common Core of Data (2017). The combined dataset includes district-level observations of third through eighth grade students from 2008-09 to 2014-15 in school districts in the U.S. with enough racial/ethnic heterogeneity to identify white-black and or white-Hispanic test score gaps.

## **2.0 Conceptual Framework**

The conceptual framework posits that an upsurge in school choice is associated with district test score gaps through processes related to district-level segregation. Prior research suggests that the influx of school choice is directly associated with increases in segregation at the district level (Frankenberg, Siegel-Hawley, & Wang, 2010; Harris, 2018). One major process through which increasing segregation exacerbates indicators of education inequity such as racial/ethnic test score gaps relates to school resources and school quality. Most evidence finds that school segregation is associated with lower resourced schools and inferior school quality for minoritized students, which affects educational outcomes into adulthood (Johnson, 2011). This is because segregation concentrates structural social and economic disadvantage in the lowest resourced schools that are also majority non-white (Rothstein, 2015).

However, there is also evidence that school choice has the capacity to improve the educational outcomes of minoritized students, despite increasing segregation, if school choice increases school quality (Whitehurst et al., 2016). In other words, minoritized students in racially homogenous charter schools may fare better than they would in racially heterogeneous neighborhood public schools if the charter schools have greater resources and demonstrate superior quality. Therefore, it is important to examine links between school choice, racial/ethnic segregation, and test score gaps to better understand how this widespread public education reform is operating across districts in the U.S. and what the implications are for education equity.

## **2.1 School Choice and Test Score Gaps**

Overall, there is great variability in whether magnet or charter schools improve students' academic performance. Wang, Schweig, and Herman (2017) found no general magnet school effect in grades K-12 across five urban school districts in four states; some district's magnet school students exhibited superior performance to traditional public school students and some exhibited no differences or significantly worse performance than traditional public school students. Charter school findings are similarly mixed with some elementary and middle school students outperforming traditional public school students who applied to but were not admitted to the same charter schools, and other students exhibiting null or worse impacts to their academic performance (Clark et al., 2015; Hoxby & Rockoff, 2005). Moreover, in 23 out of 41 urban areas in 22 states, charter school students in grades K-12 —particularly low-income, racial/ethnic minoritized, and special education students— demonstrated significantly larger growth in math and reading on average than their peers in traditional public schools, while students in the remaining areas experienced null or worse changes in academic performance (CREDO, 2015).

This research highlights the capacity for magnet and charter schools to be beneficial, neutral, or harmful to the academic performance of students who attend schools of choice, but it does not provide any evidence on the benefits or costs to the rest of the students in the district. When discussing district-level education equity, it is essential to consider the students who remain in traditional public schools in districts where choice is expanding. The indirect impacts of school choice on traditional public school students are also highly varied. For example, charter school expansion was found to be especially detrimental to the math and English language arts test performance of elementary school students in traditional public schools (Imberman, 2011). However, for elementary and middle school students in New York City, traditional public school



students in areas with charter expansion experienced neutral or slight increases in math and English language arts test performance (Cordes, 2018; Winters, 2012).

Thus, there is evidence that school choice can be advantageous, disadvantageous, or neither to the test performance of students both in schools of choice and in traditional public schools. The disparate impact school choice has on all students' academic performance in a district merits additional research to understand how these effects map onto racial/ethnic test score gaps across districts throughout the U.S. It is also necessary to understand what mechanisms might be driving differences in associations between school choice and test score gaps at the district level.

## **2.2 School Choice and Segregation**

By some measures, U.S. public schools are just as if not more segregated by race and ethnicity than they were in 1954 when *Brown vs. Board of Education* deemed segregated schools unconstitutional (Donnor & Dixon, 2013). While much of the resegregation of schools is attributable to the increasing racial and ethnic heterogeneity of the U.S. population, it is also predicted by the proliferation of school choice policies that serve as catalysts for racial/ethnic segregation (Donnor & Dixon, 2013; Fiel, 2013). The expansion of charter schools in particular is especially predictive of white-black segregation (Fiel, 2013; Frankenberg, Siegel-Hawley, & Wang, 2010).

School choice contributes to district segregation independently of neighborhood segregation, evidenced by the fact that many school districts in the country are becoming more integrated while schools are concurrently becoming more segregated (Coughlan, 2018; Monarrez, 2018). For example, in New York City, patterns of school choice leave public schools more

segregated than they would be if every student attended their assigned neighborhood public school (Mader et al., 2018). This is exemplified by catchment areas that are more than a quarter white where the neighborhood public school is less than one percent white (Mader et al., 2018). Additionally, Renzulli and Evans (2005) examined hundreds of school districts across the U.S. and found that the more integrated white students' neighborhoods were, the more likely white students were to attend charter schools, leading to increased school district segregation.

One of the reasons neighborhoods like those Mader and colleagues (2018) and Renzulli and Evans (2005) studied are becoming more integrated is due to affluent, white families moving to these catchment areas because of the presence of magnet and or charter schools as an option for their children. In other words, for parents, the idea of sending their children to the traditional public schools was a deterrent to living in certain neighborhoods, and magnet and charter schools remove that deterrent. In fact, there is evidence that an influx of school choice in an area is directly linked to an increase in gentrification (Pearman & Swain, 2017). Furthermore, even for charter schools that disproportionately enroll minoritized students, transfers of black and Hispanic students from traditional public schools to charter schools are found to be racially/ethnically segregative to the district overall (Bifulco & Ladd, 2007; Garcia, 2008; Kotok et al., 2017).

Patterns of racial/ethnic segregation tend to be coupled with an inequitable distribution of advantage which further amplifies the negative impacts of racial/ethnic segregation for district-level education equity. For example, Bifulco, Ladd, and Ross (2009) found that advantaged, high achieving students (classified as those with college educated parents and consistent reading mastery) were more likely to choose a magnet or charter school if their traditionally assigned public school had a large proportion of disadvantaged students. Harris (2018) also found that advantaged students were more likely to attend magnet schools which increases racial/ethnic

integration in magnet schools while simultaneously segregating traditional public schools in a district. Additionally, Ni (2012) examined the effect of charter school transfers on traditional public school students and found that in predominantly urban, low-income areas, charter school transfers resulted in both charter and traditional public school enrollment becoming significantly stratified by race, socioeconomic, and special education status. Thus, charter school expansion isolated minoritized, low-income, and special needs students in the most underserved traditional public schools (Ni, 2012). These patterns of school choice and segregation can potentially result in the draining of resources from neighborhood public schools in favor of schools of choice that are not serving the most disadvantaged students in a district (Dee & Fu, 2004; Riel et al., 2018). Therefore, it is likely that school segregation resulting from the proliferation of school choice has implications for districts' racial/ethnic achievement disparities.

### **2.3 Segregation and Test Score Gaps**

School segregation by race/ethnicity is one of the largest predictors of district-level test score gaps, explaining 17 and 18 percent of the variance in white-black and white-Hispanic test score gaps within states, respectively (Reardon, Kalogrides, & Shores, 2018). School segregation is also found to have disproportionately negative impacts on the academic performance of minoritized students independently of students' socioeconomic status (Bankston & Caldas, 1996; Hanushek, Kain, & Rivkin, 2009; Mickelson, 2001). Moreover, research examining racial/ethnic math test score gaps over thirty years finds that despite increases in economic mobility for Hispanic and black families, school segregation is also increasing which leads to racial/ethnic isolation and results in significant increases in test score gaps (Berends & Peñaloza, 2010).

Overall, racial/ethnic segregation in school districts exacerbates the concentration of limited resources and disadvantage in schools that are often predominantly non-white, and this negatively impacts the academic opportunities and therefore the academic performance of the students in these schools (Bifulco, Ladd, & Ross, 2009; Johnson, 2011; Mickelson, 2001; Rothstein, 2015). Consequently, racial/ethnic test score gaps tend to be largest in the most racially/ethnically segregated school districts.

### **3.0 Limitations of Prior Research**

This study attempts to address three limitations in prior research by using a national dataset with district-level data, including both charter and magnet schools, and including both white-black and white-Hispanic test score gaps.

First, the main contribution of this study is its examination of the association between school choice and test score gaps across thousands of school districts. It is unsurprising that the majority of school choice research focuses narrowly on a specific district or state since the school choice story in one district is not likely generalizable to another district due to differences in specific school choice policies, urbanicity, racial/ethnic composition, per-pupil expenditures, etc. However, as previously mentioned, evidence suggests that the dominant factors producing differences in racial/ethnic performance disparities are occurring between, rather than within districts (Reardon, Kalogrides, & Shores, 2018). Therefore, micro-level examinations of school choice within districts do little to inform the broader conversation about macro-level educational inequity. Understanding the relationship between school choice and education equity at a broader level provides new insight into overall structural trends, something that is especially important to consider when making policy decisions at the federal level.

Second, most recent school choice research, especially research examining links between segregation and school choice, is specifically concerned with charter schools and neglects magnet schools. One reason for this is that the purpose of magnet schools is often to promote voluntary racial/ethnic integration (Rossell, 2003). So, while charter schools are often segregated at the school level, magnet schools tend to be integrated at the school level (Harris, 2018; Bifulco & Ladd, 2007). Hence, it is possible that increased access to integrated schools attenuates

racial/ethnic test score gaps in a district. However, it is also possible that a district may become more segregated even as its magnet schools become more integrated (Harris, 2018). For example, in some urban, predominantly non-white school districts, certain schools attract a majority of the middle-class, white students which fosters within-school integration in a few schools at the expense of amplifying segregation at the district level (Kimelberg & Billingham, 2013). Furthermore, there is increasing evidence in cities such as St. Louis that magnet schools are becoming increasingly racially isolated despite their original intention to cultivate integration (Grooms & Williams, 2015). Therefore, when examining associations between district-level school choice and education inequity, magnet schools are just as important to examine as charter schools. Additionally, while there may be theoretical similarities in how charter and magnet schools impact district-level education equity, the schools are also fundamentally different in a variety of ways. Most notably, in addition to differences in school-level integration, magnet schools are predominantly operated under the jurisdiction of the same public school districts as traditional public schools while charter schools have their own governing bodies which can include large, for-profit educational management organizations (Ertas & Roch, 2014; Mickelson, Bottia, & Southworth, 2013). This study provides valuable insight on the unique ways that district-level enrollment in these two types of schools differentially interface with segregation and racial/ethnic test score gaps at the district level.

Third, many studies examining associations between school choice and racial/ethnic academic disparities focus either solely on white and non-Hispanic black disparities or solely on white-Hispanic disparities. One benefit of examining district-level data across thousands of school districts is the ability to examine white, black, and Hispanic populations. When discussing racial/ethnic test score gaps broadly, it is important to acknowledge and characterize the

fundamental differences in white-black and white-Hispanic test score gaps. For example, an examination of white-Hispanic and white-black test score gaps from kindergarten to 5<sup>th</sup> grade revealed that the white-Hispanic test score gap narrows while the white-black test score gap widens during those grades, and socioeconomic status explains more of the white-Hispanic gap than the white-black gap (Reardon & Galindo, 2009). These different trajectories and what explains them likely have implications for how school choice is differentially associated with education equity. For example, there is evidence that while charter schools disproportionately enroll minoritized students overall, black charter school students are more likely to be in segregated schools than Hispanic charter school students (Frankenberg & Lee, 2003). This suggests that charter school enrollment might have disproportionate implications for white-black achievement disparities. However, it is not possible to understand whether this is the case without conducting equivalent analyses on both white-black and white-Hispanic test score gaps.

By exploring trends across thousands of school districts, examining both charter and magnet schools, and analyzing the white-black and white-Hispanic test score gaps, this study contributes novel findings to the understanding of how school choice may be working to strengthen or weaken structural education inequities.

## **4.0 Research Questions**

There is a plethora of evidence to suggest that the expansion of school choice is related to increases in racial/ethnic segregation and that segregation is associated with structural education inequities such as racial/ethnic test score gaps. This study analyzes these associations on a macro level to provide insight on whether school choice is primarily working to exacerbate or attenuate racial/ethnic test score gaps and whether segregation is an underlying mechanism.

1) What is the association between magnet and charter school enrollment and the white-black and white-Hispanic test score gaps at the district level?

2) Do white-black and white-Hispanic segregation have indirect effects on the association between magnet and charter school enrollment and the white-black and white-Hispanic test score gaps at the district level?



## **5.0 Method**

### **5.1 Participants**

This study draws data from the Stanford Education Data Archive (Reardon et al., 2018), which includes school district-level data for grades three through eight from the 2008-09 to 2014-15 school years. The Archive includes 12,065 school districts which enroll roughly 35 million third through eighth graders. The data included in the Stanford Education Data Archive represent 89.5 percent of all possible data across subject, grade, district, state (including the District of Columbia), and year. The 10.5 percent of missing data are due to suppressed data for districts with less than 95 percent participation for tests for a specific subgroup (e.g. white, black, Hispanic), subject, grade, and year; suppressed individual estimates with a standard error greater than two standard deviations on the state-standardized scale; test score data not reported to EdFacts for any state in any given year; and data identified as incorrect due to data entry errors.

There are 4,613 school districts in the Stanford Education Data Archive with enough racial/ethnic heterogeneity to measure white-black and or white-Hispanic test score gaps. These districts represent only 38 percent of the districts included in the Stanford Education Data Archive, but they serve almost 29 million third through eighth graders. This is 83 percent of all the public school students in third through eighth grade —and an even larger proportion of racial/ethnic minoritized students— enrolled in districts included in the Stanford Education Data Archive. These districts were selected for analysis because they have racial/ethnic subgroups large enough (at least 20 students in each subgroup) to identify racial/ethnic test score gaps. For example, in order for a district to be included in the analyses of white-black test score gaps, the district must

have at least 20 white students and 20 black students in at least one grade in third through eighth grade in at least one school year from 2008-09 to 2014-15. The analyses include 95 percent of all possible observations in the Stanford Education Data Archive that meet the criteria described above. The five percent of observations not included are due to missing data for independent variables or covariates.

Of the 4,613 school districts that meet the racial/ethnic heterogeneity criteria, 2,171 districts have enough heterogeneity to examine both white-black and white-Hispanic test score gaps, 743 districts only have enough heterogeneity to examine white-black test score gaps, and 1,699 districts only have enough heterogeneity to examine white-Hispanic test score gaps. Of these 4,613 public school districts, 7 percent have both magnet and charter schools, 4 percent have magnet schools and no charter schools, and 19 percent have charter schools and no magnet schools. So in total, about 30 percent of the districts in the analysis sample have school choice in the form of magnets and or charters compared to only 15 percent of the 12,065 districts in the Stanford Education Data Archive overall.

Table 1 highlights that these 4,613 districts have different school choice landscapes, but are also descriptively different beyond the presence or absence of magnet and charter schools. For example, only 7 percent of the school districts without magnet and charter schools are urban while 51 percent of school districts with both magnet and charter schools are urban. Additionally, magnet and charter school enrollment are correlated with urban districts at 0.15 and 0.17 respectively (correlations are also displayed by test score gap in Tables 4-7). Furthermore, districts with magnet and charter schools are correlated with district size at 0.12 and 0.09 and have more than eight times the average public school student enrollment as districts without magnets and charters. Districts with choice are also substantially less affluent (correlated with socioeconomic status at -0.11) and

less white overall (correlated with percent white at -0.12 and -0.13). Districts with choice are also more racially and ethnically segregated (correlated with white-black segregation at 0.15 and 0.25 and with white-Hispanic segregation at 0.15 and 0.26). Finally, districts with magnet and or charter schools demonstrate lower test scores (correlated at -0.06 and -0.14) and larger test score gaps (correlated with white-black test score gaps at 0.10 and 0.05 and with white-Hispanic test score gaps at 0.07 and 0.06) on average than districts without magnet and charter schools.

## **5.2 Measures**

The majority of the data included in analyses were processed for the Stanford Education Data Archive (Reardon et al., 2018) and originally sourced from the U.S. Department of Education's EdFacts database (2017), Common Core of Data (2017), and Education Demographic, and Geographic Estimates (2017). In addition to analyzing data from the Stanford Education Data Archive, the study independently sourced and merged magnet school data from the U.S. Department of Education's Common Core of Data (2017) and information provided by Magnet Schools of America (2018).

### **5.2.1 Test score gaps**

Test scores were originally obtained from the U.S. Department of Education's EdFacts database (2017) and standardized according to the National Assessment of Educational Progress scale in order to be comparable across districts and states. The mean white-black test score gaps used for analyses represent the difference between the mean white students' test scores and mean

black students' test scores for a given test subject, grade, school district, and school year. Congruently, the mean white-Hispanic test score gaps were calculated by subtracting the mean Hispanic students' test scores from the mean white students' test scores. The black and white students' test scores used for analyses represent non-Hispanic black students and non-Hispanic white students. So, both white and black students who are Hispanic are exclusively classified as Hispanic in the dataset.

The Stanford Education Data Archive includes mean white-black test score gaps and mean white-Hispanic test score gaps for each district in every school year from 2008-09 to 2014-15. Within each district and each school year, the mean test score gaps are included for both math and English language arts tests for each grade from grades three through eight. The analyses examine math and English language arts test score gaps separately since they are descriptively different. For example, in the districts being analyzed, English language arts test score gaps are generally higher than math test score gaps and math test score gaps widen from third to eighth grade while English language arts test score gaps narrow from third to eighth grade. The descriptive differences may be related to previous findings that school resources are more relevant for math performance than reading performance (Murnane et al., 2006).

### **5.2.2 Magnet and charter enrollment**

The Stanford Education Data Archive includes variables on the total percentage of third through eighth graders combined in each district enrolled in charter schools. While charter school administrations are not linked to geographic school districts in practice, the Stanford Education Data Archive identified the geographic school district charter schools are physically located in.

The U.S. Department of Education's Common Core of Data (2017) includes school level data on magnet school enrollment which were aggregated to the district level in order to compute equivalent magnet school enrollment variables. The U.S. Department of Education's Common Core of Data is missing complete administrative data on the magnet classification of schools in Massachusetts, New Jersey, New York, Ohio, and Vermont. So, magnet school indicators for these states are supplemented with data provided by Magnet Schools of America (2018).

### **5.2.3 Segregation**

The Stanford Education Data Archive operationalizes school segregation using Theil's (1972) information theory index of segregation; the white-black and white-Hispanic information index variables are calculated by computing the mean deviation of a student's school's racial and ethnic composition from the school's district-wide racial and ethnic composition. The variable is calculated individually for each grade from third through eighth in each school year from 2008-09 to 2014-15. If the variable's value is close to one, this indicates high racial/ethnic segregation for that grade in a school district. This is a useful operationalization of segregation because the point of reference is the level of district wide integration that is possible given the racial/ethnic composition of the school district as opposed to measures of segregation that simply look at students' level of exposure to students of other races and ethnicities.

### **5.2.4 Covariates**

The analyses control for a variety of factors that are likely to explain variance in district-level racial/ethnic test score gaps. These include a continuous measure of the district's mean test

score performance by grade and year in order to control for overall district test performance. District urbanicity is controlled for and represented with a series of dummy variables for urban, suburban (reference group), rural, and town. A district is classified as urban if it is located in an urbanized area and in a principal city, suburban if it is in an urbanized area and outside of a principal city, town if it is in an urban cluster outside of an urbanized area, and rural if it is not in an urban cluster or urbanized area. The analyses also control for total district enrollment to account for district size.

Additionally, the analyses control for district socioeconomic status and racial/ethnic composition as well as district-level inequality by socioeconomic status and race/ethnicity. In order to control for district-level socioeconomic status, the analyses use a district socioeconomic status composite variable. This composite variable includes a district's median income, proportion of adults with a bachelor's degree or higher, the poverty rate in households with at least one child aged 5-17, unemployment rate, proportion of households receiving food stamps or participating in the Supplemental Nutrition Assistance Program, and proportion of households headed by a single mother. The Stanford Education Data Archive constructed this composite variable using the log of median income and weighted each variable in the composite by district enrollment. The analyses also control for district per pupil expenditures<sup>2</sup> which encompass the total district public school expenditures divided by total district public school enrollment. The analyses control for district income inequality using a Gini coefficient computed by the Stanford Education Data Archive to reflect income inequality by measuring the frequencies and dissimilarities of income in a district.

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<sup>2</sup> Per pupil expenditures for 2014-15 are not included in the Stanford Education Data Archive, so the values for the 2014-15 school year reflect the same values as the 2013-14 school year.

A coefficient closer to zero indicates equal income distribution in a district and a coefficient closer to one indicates unequal income distribution in a district (Von Hippel & Powers, 2015).

In order to control for the racial composition of the school district, the percent of students in each grade in each district who are black and Hispanic are included in the analyses. For the analyses examining the white-Hispanic test score gaps, the percent of the Hispanic population in a district that is Mexican, Puerto Rican, Cuban, Central American, and South American are included as covariates to account for the heterogeneity of the Hispanic population in the U.S. All analyses also control for the total percent of English language learners in a district.

To control for the intersection of race/ethnicity and socioeconomic status, the analyses include district-level racial/ethnic gaps in socioeconomic status to account for and illustrate the degree to which racial/ethnic test score gaps are a proxy for socioeconomic status disparities that may be correlated with certain racial and ethnic groups within a district (Fryer & Levitt, 2004). The district-level socioeconomic status gap variables represent standard deviation differences in a district's white and black and white and Hispanic parents' income and educational attainment.

Finally, while test score gaps in the Stanford Education Data Archive vary by grade and year within districts, the analyses control for all grade levels using dummy variables for grades three through eight (reference) and all school years using dummy variables from 2008-09 to 2014-15 (reference) in order to perform cross-sectional analyses. Tables 2 and 3 include a description of the samples on all the measures and Tables 4 through 7 include correlation matrices of the variables for each test score gap analysis.

## 5.3 Analytic Approach

### 5.3.1 Research question 1

The first research question examines the association of charter and magnet school enrollment and the white-black and white-Hispanic test score gaps at the district level. This association is tested using multi-level random and fixed-effects modeling specifications. The models are run separately for each test score gap (white-black math, white-black English language arts, white-Hispanic math, and white-Hispanic English language arts). Each includes a random intercept at the district and state levels and the fixed-effects model specification also includes standard longitudinal fixed effects at the district-level. All models for research question one were run in Stata 15.0.

The strength of using a multi-level approach with data exhibiting this degree of nesting (test score gaps within a grade/year, within a school district, within a state) is that the analyses are able to control for correlated errors of racial/ethnic test score gaps within a district and within a state in order to meaningfully compare test score gaps between districts and reduce the probability of type-I errors (Bryk & Raudenbush, 1992). The following equations describe the three levels of the random intercept models.

#### Equation 1

$$\text{Level 1: } Y_{ijk} = \pi_{0jk} + \pi_{pjk}a_{pijk} + e_{ijk}$$

In equation 1,  $Y_{ijk}$  represents the racial/ethnic test score gap nested in grade/year ( $i$ ), nested in district ( $j$ ), nested in state ( $k$ ), where  $\pi_{pjk}$  ( $p$  is the within district parameter) are the level-one coefficients for predictors and covariates  $a_{pijk}$  that vary within district by grade-level and or school year (percent of students enrolled in charter schools, percent of students enrolled in magnet



schools, urbanicity, grade-level, school year, mean district test performance, district size, per pupil expenditures, racial composition, and percent of English language learners), and  $e_{ijk}$  is the level-one random effect.

#### Equation 2

$$\text{Level 2: } \pi_{0jk} = \beta_{p0k} + \beta_{pqk}X_{qjk} + r_{pjk}$$

In equation 2,  $\beta_{pqk}$  ( $q$  is the between district parameter) represents the level-two coefficients for predictors and covariates  $X_{qjk}$  that vary between district (percent of students enrolled in charter schools, percent of students enrolled in magnet schools, urbanicity, mean district test performance, district size, socioeconomic status, per pupil expenditures, socioeconomic inequality, racial composition, percent of a district's Hispanic population representing different nationalities, percent of English language learners, and racial/ethnic differences in family income and parent education) and  $r_{pjk}$  is the district-level random effect.

#### Equation 3

$$\text{Level 3: } \beta_{p0k} = \beta_{pq0} + u_{pqk}$$

In equation 3,  $u_{pqk}$  is the random effect for state to account for districts being nested within states. While there are no state-level predictors in the models, state-level education policies vary drastically and likely influence district-level test score gaps. For example, as of 2016, seven states (KY, MT, ND, NE, SD, VT, and WV) did not have laws allowing charter schools (NCES, 2017).

A general concern of analyzing data at the school district level is omitted variable bias. There are remaining factors at the individual student, school, and district level that influence district-level racial/ethnic test score gaps and are not measurable in these random intercept models. Obvious omitted variables include other forms of school choice such as vouchers and open enrollment, which are not explored in these analyses. Omitted variable bias is addressed in this study with random intercept models controlling for district-level fixed effects.

The fixed effects models replicate the random intercept models described previously, but they control for each variable's district mean for a given grade from 2008-09 to 2014-15. The benefit of this approach is that it removes variance explained by unmeasured time-invariant variables at level one (Miller, Henry, & Votruba-Drzal, 2016). So, each district serves as its own counterfactual over time by examining whether deviation from a district's mean magnet and charter school enrollment predicts deviation from a district's mean white-black or white-Hispanic test score gap. In other words, these analyses determine whether test score gaps for a given grade scale around their district average from 2009 to 2015 in the same systematic way as school choice enrollment.

In these analyses, the covariate values are also difference from mean values with the exception of urbanicity, socioeconomic status, the Gini coefficient, white-black/white-Hispanic differences in family income, white-black/white-Hispanic differences in parent education, and ethnic composition of the Hispanic population (percent Central American, Cuban, Mexican, Puerto Rican, and South American). While many of these covariates may be time variant in reality, they are time invariant in the Stanford Education Data Archive and therefore treated as time invariant in the models. The fixed effects analyses still control for the time invariant variables because they may still predict the degree to which a district deviates from its mean test score gap over time. For example, a district with a higher Gini coefficient (indicating larger income inequality) may predict greater growth in test score gaps over time than district with less income inequality.

### **5.3.2 Research question 2**

The second research question examines segregation as a mediator of the association between charter and magnet school enrollment and the white-black and white-Hispanic math and

English language arts test score gaps at the district level. The mediation models are analyzed by measuring the indirect effects of school choice on racial/ethnic test score gaps through racial/ethnic segregation in a structural equation modeling framework conducted in Mplus 8.1. Congruently to the analytic plan described in research question one, the models are run separately for each of the four test score gaps with white-black segregation as a mediator between magnet and charter school enrollment and white-black math and English language arts test score gaps and white-Hispanic segregation as a mediator between magnet and charter school enrollment and white-Hispanic math and English language arts test score gaps.

The mediation analyses are two-level models (levels one and two are the same as those specified in equations 1 and 2 in research question one) with a cluster adjustment for state. The benefit of using a structural equation modeling framework is that it specifies the direct and indirect effects of multiple pathways in a single model and assesses how well these pathways fit the observed data; this improves precision and causal inference (Hayes, 2009). Another difference between the structural equation modeling framework and the regression framework is that the models discretely partition level one and level two variance. Thus, unlike the model specification described in research question one, the indirect effects models for research question two partition the level-one, or within-district variance, and the level-two, or between-district variance, in separate models. In other words, the models in research question one examine between-district effects while still controlling for within-district variables and employ district fixed effects to examine within-district effects while still controlling for between-district variables. The main difference in model specification for research question two is that the within-district mediation models do not control for variables without within-district variance (socioeconomic status, Gini coefficient, white-black/white-Hispanic differences in family income and parent education, and

ethnic composition of the Hispanic population) and the between-district mediation models do not control for variables without between-district variance (grade-level and school year dummy variables).

Appropriate model fit is assessed using a chi-square significance test to examine whether there are significant differences between the implied and observed covariance matrix; the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) to compare the model with a baseline model; the Root Mean Squared Error of Approximation (RMSEA) to examine parsimony; and Standardized Root Mean Square Residual (SRMR) to examine differences between the observed and implied correlation matrix (Hu & Bentler, 1999). Good fit is obtained if the chi-square test is non-significant, CFI and TLI are values above .95, RMSEA values are below .06, and SRMR values are below .08 (Hu & Bentler, 1999).

## **6.0 Results**

### **6.1 Research Question 1**

The first research question examines associations between districts' school choice enrollment and racial/ethnic test score gaps. The results confirm that the dominant variance explaining differences in test score gaps is occurring between districts, rather than within districts or between states. General trends also indicate that greater district-level socioeconomic status, income inequality, and racial/ethnic socioeconomic disparities are associated with larger district-level test score gaps. However, even when accounting for these and other district characteristics, there are small but significant associations between magnet and charter school enrollment and racial/ethnic test score gaps. The results of the first research question are displayed in Tables 8-11. Effect sizes of the associations between charter and magnet enrollment and test score gaps are also displayed in Figures 1 and 2.

#### **6.1.1 White-black test score gaps**

Table 8 includes the results of the three-level random intercept models for the white-black test score gaps. Districts' charter school enrollment predicts significant variance in the white-black test score gaps. For every additional ten percent of students in a district attending a charter school, a district's white-black math test score gap is an average of 0.29 points (0.03 standard deviation units) larger and the white-black English language arts test score gap is 0.32 points (0.03 standard

deviation units) larger on average. Magnet school enrollment marginally predicts a 0.1 point (0.01 standard deviation units,  $p=.054$ ) larger gap in the white-black math test score gap per ten percent of students in a district enrolled and magnet school enrollment does not significantly predict variance in the white-black English language arts test score gap.

In accordance with the random intercept model's finding, Table 9 demonstrates that in the model controlling for district fixed effects, a ten percent increase in a district's mean percent of students in the district enrolled in charter schools significantly predicts a 0.3 point increase (0.06 standard deviation units) in the white-black math test score gap and a 0.27 point increase (0.04 standard deviation units) in the white-black English language arts test score gap. In other words, when a district's charter school enrollment is ten percent greater than the district's average charter school enrollment from 2008-09 to 2014-15 overall, this predicts a white-black test score gap that is about 5 percent of a standard deviation larger than that district's average.

In contrast, Table 9 demonstrates that a ten percent increase from a district's mean percent of students in the district enrolled in magnet schools significantly predicts a 0.14 point decrease (0.02 standard deviation units) in the white-black English language arts test score gap. Additionally, the random intercept model without fixed effects found a marginal association between magnet school enrollment and the white-black math test score gap while the model controlling for district fixed effects found no significant association between deviation from a districts' mean magnet school enrollment and deviation from a districts' mean white-black math test score gap.

### **6.1.2 White-Hispanic test score gaps**

Table 10 includes the results of the random intercept models for the white-Hispanic test score gaps. While charter school enrollment is predictive of variance in the white-black test score gaps, magnet school enrollment drives the school choice effects in the white-Hispanic test score gaps. Table 10 indicates that for every additional ten percent of students in a district attending a magnet school, a district's white-Hispanic math test score gap is an average of 0.14 points (0.02 standard deviation units) larger and the white-Hispanic English language arts test score gap is an average of 0.15 points (0.01 standard deviation units) larger. Charter school enrollment marginally predicts a 0.14 point (0.01 standard deviation units,  $p=.075$ ) larger gap in the white-Hispanic English language arts test score gap per ten percent of students in a district enrolled, and charter school enrollment does not significantly predict variance in the white-Hispanic math test score gap.

These findings were not replicated in the models controlling for district fixed effects. Table 11 indicates that there are no significant associations between the deviation of districts' school choice enrollment from districts' mean school choice enrollment from 2008-09 to 2014-15 and deviations in districts' white-Hispanic test score gaps during the same time periods.

## **6.2 Research Question 2**

The second research question examines white-black segregation as a mediator of the associations between school choice enrollment and white-black test score gaps and white-Hispanic segregation as a mediator of the associations between school choice enrollment and white-

Hispanic test score gaps at the district level. Overall, while the effects of associations between school choice and test score gaps are small, the results support that segregation is one mechanism through which charter school enrollment predicts larger racial/ethnic test score gaps. However, there is no evidence that magnet school enrollment is significantly associated with racial/ethnic segregation; therefore, racial/ethnic segregation does not mediate associations between magnet school enrollment and test score gaps in the analyses. The mediation results are displayed in Tables 12-15. All of the mediation models demonstrate good fit.

### **6.2.1 White-black test score gaps**

Table 12 suggests that charter school enrollment significantly predicts white-black segregation ( $\beta=0.22$ ) which significantly predicts white-black math test score gaps ( $\beta=0.14$ ) and there is a significant indirect effect ( $\beta=.03$ ) of this association between districts. The same significant paths are demonstrated in the English language arts test score gap where the effect size of the indirect effect is also  $\beta=0.03$ . Table 13 demonstrates that within districts, across grade-levels and years, charter school enrollment significantly predicts white-black segregation ( $\beta=0.07$ ) which significantly predicts white-black English language arts test score gaps ( $\beta=0.02$ ) and there is very small but significant indirect effect ( $\beta=.001$ ). The analyses find no significant effects of magnet school enrollment on white-black segregation or significant indirect effects of white-black segregation on the association between magnet school enrollment and white-black test score gaps within or between districts.



### 6.2.2 White-Hispanic test score gaps

Similarly to the findings with magnet school enrollment and white-black segregation, Tables 14 and 15 suggest that magnet school enrollment is not predictive of white-Hispanic segregation. The findings of the random intercept models in research question one provide evidence that magnet school enrollment significantly predicts larger white-Hispanic test score gaps between districts, yet the mediation analyses indicate that white-Hispanic segregation is not a significant mechanism underlying this association.

Furthermore, while the results of research question one find no main effects of charter school enrollment on white-Hispanic test score gaps, the mediation models in Table 14 suggest that charter school enrollment is significantly associated with white-Hispanic segregation ( $\beta=0.16$ ) which significantly predicts white-Hispanic math test score gaps ( $\beta=0.21$ ) and there is a significant indirect effect ( $\beta=.03$ ) of this association between districts. These associations are also salient for the English language arts gap between districts; charter school enrollment significantly predicts white-Hispanic segregation ( $\beta=0.16$ ) which significantly predicts white-Hispanic English language arts test score gaps ( $\beta=0.27$ ) and there is a significant indirect effect ( $\beta=.04$ ). Additionally, similar to the paths within districts, across grade-levels and years, for the white-black English language arts gap, Table 15 highlights that charter school enrollment significantly predicts white-Hispanic segregation ( $\beta=0.03$ ) which significantly predicts white-Hispanic English language arts test score gaps ( $\beta=0.04$ ) and there is a very small but significant indirect effect ( $\beta=.001$ ) within districts.

## 7.0 Discussion

School choice is expanding rapidly in the U.S. while robust racial/ethnic segregation and test score gaps reflect staunch structural education inequity. Yet, the variability of findings in school choice research conducted within districts and states does little to inform best policy practices at the federal level. Consequently, macro-level analyses such as those presented in this study are necessary to explicate whether school choice is operating to exacerbate or attenuate structural education equity. In addition to taking a useful macro-level approach, this secondary analysis contributes novel and pertinent information to the school choice conversation by examining both charter and magnet schools as well as examining the white-black and white-Hispanic test score gaps.

Given the proliferation of school choice, it is important to highlight that the random intercept models without fixed effects (where between-district variance is primarily driving the effects) provide no evidence that charter or magnet school enrollment is significantly associated with narrowing district-level race/ethnicity test score gaps. Furthermore, these results demonstrate small but significant evidence that charter and magnet school enrollment are associated with larger district-level test score gaps even when controlling for other district characteristics, including socioeconomic status disparities by race/ethnicity. In the random intercept models controlling for district fixed effects (where within-district variance over time is primarily driving the effects), only magnet school enrollment suggests a possible attenuation of white-black English language arts gaps while charter school enrollment suggests a possible exacerbation of white-black test score gaps. The analyses controlling for district fixed effects suggest that school choice enrollment is not significantly associated with white-Hispanic test score gaps, positively or negatively.

It is useful to consider the results both with and without controlling for fixed effects due to the differences in between-district comparisons versus within-district comparisons driving the effects. While the random intercept models with fixed effects provide a more compelling causal argument, these models are only capable of highlighting associations in districts with variability from 2008-09 to 2014-15. In other words, when the independent and dependent variables are constrained to be within-district, this also constrains the distribution and there is less power to detect an effect. For example, if 80 percent of third through eighth graders in a district are enrolled in charter schools every year from 2008-09 to 2014-15, that district's difference from mean value is zero in every wave, the same as it would be in a district with zero percent charter enrollment from 2008-09 to 2014-15. As a result, the fixed effects estimates are conservative, which provides one possible explanation for why the magnet school effects were not replicated for the white-Hispanic test score gaps.

This distinction is even more salient for the mediation models which partition all the variance into within or between district models. Thus, it is unsurprising that the indirect effects were weak or non-significant for the within-district models where districts were only being compared to themselves across grade-levels and years without accounting for any variance between districts.

Despite the inability to account for within and between district variance in the same models, the mediation analyses highlight important pathways, primarily between districts, that suggest racial/ethnic segregation is a major mechanism through which charter school enrollment may be exacerbating education inequity for both black and Hispanic students. For example, white-black segregation accounts for almost 60 percent of the association between charter school enrollment and the white-black math test score gap. This finding is consistent with literature that demonstrates

associations between charter school enrollment, racial/ethnic segregation, and widening test-score gaps (Bifulco & Ladd, 2007; Fiel, 2013; Frankenberg, Siegel-Hawley, & Wang, 2010).

While segregation is a significant mediator for charter school enrollment, the results provide no evidence that magnet school enrollment is associated with district-level racial/ethnic segregation. This finding is contrary to prior research that demonstrates magnet schools, similarly to findings on charter schools, are associated with greater district-wide segregation (Harris, 2018). However, previous literature indicates that, at the school level, charter schools are predominantly racially/ethnically segregated while magnet schools are integrated (Bifulco & Ladd, 2007; Harris, 2018). Hence, this school-level difference between magnets and charters may be more relevant for district-level segregation and education inequity at a macro level. Furthermore, all the mediation models indicate that racial/ethnic segregation is associated with larger racial/ethnic test score gaps and there is no evidence that racial/ethnic education inequity is attenuated despite increases in racial/ethnic segregation at the district level.

Additionally, the patterns of associations between school choice and test score gaps differ for white-black and white-Hispanic test score gaps. This highlights that school choice is affecting minoritized populations differently, and that charter schools appear to be more detrimental to education equity between white and black students through processes including racial/ethnic segregation, while magnet schools may be more detrimental to education equity between white and Hispanic students, but due to processes unrelated to racial/ethnic segregation. This is consistent with literature that finds charter schools both disproportionately enroll and are disproportionately detrimental to black students more so than any other racial/ethnic subgroup (Frankenberg & Lee, 2003). Therefore, it may be the case that magnet schools are more likely to drive white-Hispanic inequity because they are more prevalent in predominantly Hispanic districts

than charter schools. It should also be emphasized, however, that the associations between charter school enrollment and white-black test score gaps are robust both with and without controlling for district fixed effects and are much larger than the effects of associations between white-Hispanic test score gaps, which are not replicated when controlling for district fixed effects.

Overall, the size of direct and indirect effects in research questions one and two are quite small. For example, a third of a point on a test score gap that averages about 20 points may not seem like a large enough effect to take the implications of this study seriously. However, even a third of a point is meaningful when considering the millions of students attending schools of choice each year and the districts, states, and independent organizations opening schools of choice at an expeditious rate with, at most, the goal of reducing racial/ethnic disparities and, at least, without the goal of exacerbating inequities. In other words, despite being small, the general trends are clear and if the goal is to eliminate racial/ethnic disparities on test performance, school districts need to be mindful about the processes through which their schools of choice may be exacerbating district-level racial/ethnic inequities such as racial/ethnic segregation.

Given that much of school segregation is attributable to neighborhood segregation, school choice theoretically provides a unique opportunity to integrate schools by drawing on many catchment areas so that students' schools do not depend on the value of their parents' homes (Riel et al., 2018). However, there are many school districts where school choice is actively working to segregate school districts even as neighborhoods are becoming more integrated (Harris, 2018; Mader et al., 2018; Renzulli & Evans, 2005). Currently, charter schools do not have the same equity measures and requirements as other public schools (Frankenberg et al., 2019). Perhaps, if more charter schools implemented intentional desegregation policies, it is possible the association between charter school enrollment and test score gaps at the district level would be mitigated.

Overall, while there is no easy education policy solution that will assuredly narrow test score gaps, especially without broader comprehensive social policies, it is still important to intervene where the proliferation of school choice is impeding progress towards education equity.

## 8.0 Limitations and Future Research

This secondary analysis has several limitations. The largest limitation is the inability to draw causal conclusions about whether school choice is driving an increase in racial/ethnic test score gaps. The fixed effects analyses and mediation models do provide compelling causal inference. However, the fixed effects analyses include time variant covariates operationalized with time invariant variables and the mediation analyses do no control for important variables without within-district variance in the within-district models and similarly do not control for important variables without between-district variance in the between-district models. So, all analytic specifications are limited in their ability to fully rule out all possible covariates. These measurement restrictions also reflect a limitation of working with large administrative datasets.

Public availability of large administrative datasets provides incredible opportunities for examining policy relevant questions at a macro level, but there are notable limitations in the types of questions that can be answered. For example, the Stanford Education Data Archive (Reardon et al., 2018) only includes aggregated charter school enrollment for all third through eighth graders in a district, so analyses cannot examine charter school enrollment by grade. Given differences in the grade levels served by schools of choice and differences in the academic and psychological development of third graders versus eighth graders, future research should examine differences in associations between school choice and education equity by grade level. Furthermore, while the Stanford Education Data Archive (Reardon et al., 2018) removed data with blatant administrative errors, there is always a risk of additional administrative data errors when working with this volume of data.

The analyses are also limited in their generalization to all school choice. This study exclusively considers magnet and charter schools, which only comprise a piece, albeit a large piece, of the overall school choice landscape. Future analyses should also investigate open enrollment, vouchers, and private school choice to examine a more comprehensive story about the relationship between school choice and education equity even more broadly.

Additionally, the mediator in these analyses is average racial/ethnic segregation at the district level which is not as strong a predictor of achievement disparities as racial/ethnic segregation at the larger metropolitan level (Reardon, Kalogrides, & Shores, 2018). Segregation only explains 17 and 18 percent of the district-level white-black and white-Hispanic test score gaps within states, respectively, while it explains 51 and 58 percent of metropolitan level test score gaps (Reardon, Kalogrides, & Shores, 2018). This is because most of the starkest racial/ethnic segregation occurs between districts within geographic regions (EdBuild, 2016). In other words, if a predominantly white school district is adjacent to a predominantly black school district, it is possible that both of these districts will score relatively low on the segregation index given their low capacity for within-district integration. The fact that these districts reflect a larger pattern of segregation between districts is not accounted for in the mediation analyses. This is especially important given that the catchment areas of magnet and charter schools do not always correspond to existing school districts. So, magnet and charter schools may be working to segregate or integrate school districts beyond those in which they are physically located, which the analyses do not capture. Furthermore, it is important to note that while this study highlights negative implications of within district segregation for achievement equity, even with integrated schools there is capacity for within school segregation through mechanisms such as gifted and talented



programs that may undermine efforts of district-wide integration (Roda, 2015). Thus, school segregation operates through complex processes that are not dissected in this study.

The generalizability of these findings is also limited by the oversimplification of achievement disparities as white-black and white-Hispanic test score gaps. Racial/ethnic test score gaps are one signal of education inequity but there are a multitude of confounds with test scores as a marker of academic achievement ranging from stereotype threat to racial/ethnic inequities in achievement-based tracking (Berlak, 2001). Furthermore, there are significant intersections between race and ethnicity, and collapsing students into single racial or ethnic categories masks the more complicated ways that race and ethnicity are linked to achievement. This also highlights the inability of this study to account for intersectionality more broadly; for example, there are rigorous controls for socioeconomic factors, socioeconomic inequality, and socioeconomic inequality by race/ethnicity, but just controlling for these variables cannot fully account for and parse the complex and systematic ways that socioeconomic factors intersect with race and ethnicity. Furthermore, the variable in the Stanford Education Data Archive measuring differences in the free lunch rates in the average white student's school and the average black or Hispanic student's school in a district is correlated with the racial/ethnic segregation variable at 0.8 or higher. Thus, this study could not completely disentangle racial/ethnic segregation from socioeconomic segregation by race/ethnicity.

Given these limitations, future research should explore more comprehensive and nuanced operationalizations of school choice, segregation, and educational achievement disparities. Despite limitations, this study provides critical and novel information on associations between magnet and charter school enrollment, racial/ethnic segregation, and education inequity at the district level across thousands of districts. These findings are especially important to consider when making

policy decisions at the federal level. While individual districts and states have unique school choice policies with distinctive impacts on education inequity, charter school enrollment in particular has the strongest significant associations with white-black segregation and test score gaps at the district level that should not be ignored when drafting policies on school choice expansion. Overall, this study highlights that while school choice is widely transforming public education, it has potentially negative implications for structural racial/ethnic education equity in the U.S.

## Appendix

**Table 1. Group Means by School Choice Composition for Grades Three Through Eight in 2009-2015 for Public School Districts with Racial/Ethnic Heterogeneity**

	Districts with no magnet or charter schools		Districts with both magnet and charter schools		Districts with just magnet schools		Districts with just charter schools	
N	3,232		302		180		897	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Mean district math test score (NAEP scale)	253.81	14.40	247.24	11.59	249.02	13.35	249.85	13.11
Mean White-Black math test score gap	18.84	7.14	23.07	8.21	21.36	7.93	19.67	7.35
Mean White-Hispanic math test score gap	12.94	7.14	16.77	8.14	15.35	7.76	13.84	7.02
Mean district ELA test score (NAEP scale)	236.02	14.79	228.85	11.41	232.65	13.27	231.59	12.81
Mean White-Black ELA test score gap	19.80	7.92	24.78	9.91	23.30	9.18	20.84	8.48
Mean White-Hispanic ELA test score gap	16.20	8.38	21.40	10.41	19.98	9.94	18.20	8.35
Mean district enrollment/1000	3.24	3.68	28.83	60.39	10.15	15.06	8.75	12.26
Mean socioeconomic status composite	0.10	0.98	-0.45	1.05	-0.21	1.07	-0.09	0.95
Per pupil expenditures/1000	12.48	4.23	12.12	4.09	13.04	4.07	11.38	3.69
Gini coefficient	0.37	0.06	0.41	0.05	0.39	0.05	0.38	0.05
Percent Native American per grade	1%	4%	1%	2%	1%	1%	1%	4%
Percent Asian per grade	4%	7%	4%	6%	5%	6%	4%	6%
Percent Hispanic per grade	20%	21%	27%	22%	22%	22%	29%	25%
Percent Black per grade	13%	17%	27%	25%	25%	24%	13%	18%
Percent White per grade	62%	22%	41%	24%	48%	24%	52%	26%
White-Black segregation	0.04	0.06	0.17	0.14	0.09	0.09	0.10	0.10
White-Hispanic segregation	0.03	0.05	0.15	0.11	0.09	0.09	0.08	0.09
Percent of students that are ELL	6%	8%	10%	9%	8%	9%	10%	10%
White-Black difference in family income	0.64	0.54	0.70	0.42	0.67	0.38	0.63	0.48
White-Hispanic difference in family income	0.62	0.51	0.68	0.37	0.71	0.39	0.62	0.44
White-Black difference in parent education	0.19	0.44	0.28	0.36	0.19	0.38	0.16	0.41
White-Hispanic difference in parent education	0.62	0.50	0.74	0.39	0.66	0.37	0.71	0.42
Urban	7%	25%	51%	49%	36%	46%	24%	41%
Suburb	39%	47%	37%	46%	44%	47%	37%	46%
Town	26%	41%	7%	23%	13%	31%	20%	38%
Rural	27%	41%	5%	19%	7%	22%	19%	35%

**Table 2. Descriptive Statistics for Analyses of White-Black Test Score Gaps**

			Math	ELA
	Observations (level 1 N):		75,422	81,021
	Districts: (level 2 N):		2,599	2,606
	States: (level 3 N):		50	50
	Mean	SD	Minimum	Maximum
Mean district math test performance (NAEP scale)	251.79	21.26	190.56	343.10
Mean White-Black math test score gap	19.92	9.27	-24.09	84.66
Mean district ELA test performance (NAEP scale)	233.13	22.43	153.49	317.00
Mean White-Black ELA test score gap	21.41	10.40	-25.84	147.54
Total district membership/1000	10.13	24.45	0.36	758.30
Socioeconomic status composite	-0.24	1.00	-3.62	2.31
Per pupil expenditures/1000	12.04	3.71	2.84	40.37
Gini coefficient	0.39	0.05	0.19	0.57
Percent Native American per grade	1%	2%	0%	48%
Percent Asian per grade	4%	6%	0%	77%
Percent Hispanic per grade	17%	20%	0%	99%
Percent Black per grade	25%	20%	0%	98%
Percent White per grade	54%	23%	1%	100%
White-Black Segregation	0.09	0.11	0.00	0.90
Percent of students that are ELL	6%	8%	0%	69%
White-Black difference in family income	0.67	0.44	-1.97	2.96
White-Black difference in parent education	0.18	0.35	-1.10	1.98
Percent enrolled in charter schools	3%	7%	0%	97%
Percent enrolled in magnet schools	3%	12%	0%	100%
Urbanicity	<b>Frequency</b>			
Urban	23%			
Suburb (reference)	39%			
Town	16%			
Rural	22%			
Grade				
Three	16%			
Four	17%			
Five	17%			
Six	17%			
Seven	17%			
Eight (reference)	17%			
Year				
2008-09	15%			
2009-10	15%			
2010-11	15%			
2011-12	16%			
2012-13	15%			
2013-14	12%			
2014-15 (reference)	12%			

Note: Montana is the state excluded from analyses due to missing data and lack of racial/ethnic heterogeneity

**Table 3. Descriptive Statistics for Analyses of White-Hispanic Test Score Gaps**

		Math	ELA	
	Observations (level 1 N):	89,514	96,364	
	Districts: (level 2 N):	3,372	3,371	
	States: (level 3 N):	50	50	
	Mean	SD	Minimum	Maximum
Mean district math test performance (NAEP scale)	252.86	21.48	190.89	343.10
Mean White-Hispanic math test score gap	14.08	9.10	-36.27	80.63
Mean district ELA test performance (NAEP scale)	233.94	22.93	157.70	312.22
Mean White-Hispanic ELA test score gap	18.01	10.78	-39.46	153.68
Total district membership/1000	9.11	22.63	0.22	758.30
Socioeconomic status composite	0.08	0.91	-3.36	2.67
Per pupil expenditures/1000	12.02	4.10	3.51	47.06
Gini coefficient	0.37	0.05	0.14	0.56
Percent Native American per grade	1%	4%	0%	92%
Percent Asian per grade	4%	7%	0%	77%
Percent Hispanic per grade	28%	22%	0%	99%
Percent Black per grade	12%	15%	0%	98%
Percent White per grade	54%	24%	0%	100%
White-Hispanic Segregation	0.06	0.09	0.00	0.89
Percent of Hispanic population from Central America	6%	9%	0%	89%
Percent of Hispanic population from Cuba	1%	4%	0%	65%
Percent of Hispanic population from Mexico	68%	30%	0%	100%
Percent of Hispanic population from Puerto Rico	11%	19%	0%	100%
Percent of Hispanic population from South America	5%	9%	0%	83%
Percent of students that are ELL	9%	10%	0%	73%
White-Hispanic difference in family income	0.64	0.42	-2.18	2.32
White-Hispanic difference in parent education	0.74	0.39	-0.94	2.37
Percent enrolled in charter schools	3%	7%	0%	93%
Percent enrolled in magnet schools	2%	10%	0%	100%
Urbanicity	Frequency			
Urban	20%			
Suburb (reference)	41%			
Town	22%			
Rural	17%			
Grade				
Three	17%			
Four	17%			
Five	17%			
Six	17%			
Seven	16%			
Eight (reference)	16%			
Year				
2008-09	14%			
2009-10	14%			
2010-11	15%			
2011-12	17%			
2012-13	16%			
2013-14	11%			
2014-15 (reference)	13%			

Note: Vermont is the state excluded from analyses due to missing data and lack of racial/ethnic heterogeneity

**Table 4. Correlations for the Analyses of White-Black Math Test Score Gaps**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	
1 Mean White-Black test score gap	1.00																																		
2 Grade Three	-0.12	1.00																																	
3 Grade Four	-0.07	-0.22	1.00																																
4 Grade Five	-0.03	-0.21	-0.21	1.00																															
5 Grade Six	0.03	-0.21	-0.21	-0.21	1.00																														
6 Grade Seven	0.08	-0.20	-0.20	-0.19	-0.19	1.00																													
7 Grade Eight*	0.12	-0.19	-0.19	-0.19	-0.19	-0.18	1.00																												
8 2008-09	0.00	-0.01	-0.01	-0.01	0.00	0.01	0.01	1.00																											
9 2009-10	-0.02	0.00	0.00	0.00	0.00	0.01	0.01	-0.18	1.00																										
10 2010-11	-0.01	-0.01	0.00	0.00	0.00	0.01	0.01	-0.18	-0.18	1.00																									
11 2011-12	-0.01	0.00	0.00	0.00	0.00	-0.01	0.00	-0.18	-0.18	-0.18	1.00																								
12 2012-13	0.01	0.00	0.00	0.01	0.00	-0.01	-0.01	-0.17	-0.18	-0.18	-0.18	1.00																							
13 2013-14	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.15	-0.15	-0.16	-0.15	-0.15	1.00																						
14 2014-15*	0.02	0.01	0.01	0.01	0.00	-0.01	-0.03	-0.15	-0.16	-0.16	-0.16	-0.16	-0.14	1.00																					
15 Suburb*	0.04	-0.01	-0.01	0.00	0.01	0.00	0.01	-0.02	-0.03	-0.03	0.03	0.03	0.02	0.00	1.00																				
16 Urban	0.16	0.01	0.01	0.01	0.00	-0.01	-0.01	0.00	-0.01	-0.01	0.01	0.01	-0.01	0.01	-0.44	1.00																			
17 Town	-0.06	0.00	0.00	0.00	0.00	0.00	-0.01	0.01	0.01	0.00	0.00	-0.01	-0.01	0.00	-0.36	-0.23	1.00																		
18 Rural	-0.16	0.00	0.00	-0.01	-0.01	0.01	0.01	0.02	0.03	0.05	-0.04	-0.04	-0.02	-0.01	-0.43	-0.28	-0.23	1.00																	
19 Mean district test score (NAEP scale)	0.29	-0.53	-0.31	-0.09	0.13	0.33	0.53	0.00	0.00	0.01	0.00	0.01	0.01	-0.04	0.18	-0.06	-0.08	-0.08	1.00																
20 Total district membership	0.11	0.00	0.00	0.01	0.00	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.01	-0.01	0.01	0.01	0.20	-0.12	-0.11	-0.01	1.00															
21 Socioeconomic status composite	0.21	-0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	-0.01	-0.01	0.41	-0.13	-0.25	-0.14	0.41	0.02	1.00														
22 Per pupil expenditures	0.10	-0.01	-0.01	-0.01	-0.01	0.02	0.03	0.03	0.01	0.01	0.01	0.00	0.00	-0.07	0.26	0.05	-0.17	-0.21	0.10	0.00	0.16	1.00													
23 Gini coefficient	0.04	0.01	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.02	-0.41	0.24	0.24	0.03	-0.28	0.08	-0.76	-0.10	1.00												
24 Pct. White per grade*	0.02	-0.03	-0.02	-0.02	-0.01	0.05	0.04	0.02	0.01	0.01	-0.01	-0.01	0.01	-0.03	0.06	-0.22	0.03	0.12	0.31	-0.19	0.43	-0.08	-0.36	1.00											
25 Pct. Hispanic per grade	-0.04	0.04	0.03	0.04	0.02	-0.07	-0.07	-0.03	-0.03	-0.01	0.01	0.02	-0.02	0.05	0.06	0.20	-0.10	-0.19	-0.16	0.20	-0.05	0.00	0.05	-0.60	1.00										
26 Pct. Black per grade	-0.02	-0.01	-0.01	-0.02	-0.01	0.02	0.02	0.00	0.01	0.00	-0.01	-0.01	0.02	-0.01	-0.19	0.02	0.11	0.12	-0.27	-0.01	-0.58	0.05	0.45	-0.54	-0.29	1.00									
27 Pct. Asian per grade*	0.15	0.01	0.01	0.02	0.01	-0.03	-0.02	-0.01	-0.01	-0.01	0.02	0.02	-0.02	0.01	0.23	0.12	-0.19	-0.23	0.19	0.12	0.43	0.19	-0.28	-0.10	0.09	-0.27	1.00								
28 Pct. Native American per grade*	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	-0.02	0.00	-0.01	-0.08	0.04	0.08	-0.03	-0.03	0.01	-0.05	-0.10	0.05	-0.05	0.02	-0.07	-0.03	1.00							
29 Pct. of students that are ELL	0.07	0.02	0.02	0.02	0.02	-0.05	-0.04	0.00	0.01	-0.06	0.01	0.01	-0.03	0.05	0.04	0.24	-0.12	-0.19	-0.11	0.19	-0.05	-0.01	0.09	-0.49	0.74	-0.22	0.25	0.01	1.00						
30 White-Black difference in family income	0.29	0.00	-0.01	0.00	0.00	0.01	0.00	-0.01	0.00	0.00	-0.01	0.00	0.01	0.01	-0.13	0.05	0.09	0.02	0.04	0.02	-0.04	-0.04	0.23	0.02	-0.09	0.06	-0.01	-0.02	-0.01	1.00					
31 White-Black difference in parent education	0.38	0.01	0.01	0.00	-0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	-0.01	0.00	-0.22	0.16	0.13	-0.02	0.05	0.07	-0.01	0.08	0.26	-0.02	-0.02	0.04	0.02	-0.03	0.04	0.49	1.00				
32 White-Black Segregation	0.10	0.09	0.08	0.06	-0.06	-0.09	-0.09	-0.02	-0.01	0.00	0.00	0.00	0.00	0.02	-0.10	0.24	-0.14	0.00	-0.24	0.40	-0.19	-0.01	0.25	-0.29	0.10	0.24	-0.01	0.01	0.14	0.07	0.07	1.00			
33 Pct. enrolled in charter schools	0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.03	-0.02	0.01	0.02	0.04	0.05	-0.01	0.18	-0.09	-0.09	-0.09	0.13	-0.16	0.03	0.12	-0.22	0.13	0.13	0.01	0.03	0.12	-0.04	0.04	0.31	1.00		
34 Pct. enrolled in magnet schools	0.08	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	0.00	0.01	0.01	-0.01	0.02	0.02	0.15	-0.08	-0.10	-0.05	0.11	-0.10	0.09	0.11	-0.15	0.02	0.15	0.04	-0.02	0.07	-0.01	0.05	0.14	0.16	1.00	

\*denotes variable not included in models

**Table 5. Correlations for the Analyses of White-Black English Language Arts Test Score Gaps**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1 Mean White-Black test score gap	1.00																																	
2 Grade Three	0.02	1.00																																
3 Grade Four	0.04	-0.20	1.00																															
4 Grade Five	0.01	-0.20	-0.20	1.00																														
5 Grade Six	-0.01	-0.20	-0.20	-0.20	1.00																													
6 Grade Seven	-0.03	-0.20	-0.20	-0.20	-0.20	1.00																												
7 Grade Eight*	-0.04	-0.20	-0.20	-0.20	-0.20	-0.20	1.00																											
8 2008-09	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.00																										
9 2009-10	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.17	1.00																									
10 2010-11	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.17	-0.18	1.00																								
11 2011-12	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.18	-0.18	-0.18	1.00																							
12 2012-13	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.18	-0.18	-0.18	-0.18	1.00																						
13 2013-14	0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.15	-0.15	-0.15	-0.16	-0.16	1.00																					
14 2014-15*	0.03	0.01	0.01	0.01	0.00	-0.01	-0.01	-0.16	-0.16	-0.16	-0.16	-0.16	-0.14	1.00																				
15 Suburb*	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.02	0.03	0.03	0.02	0.00	1.00																			
16 Urban	0.16	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.01	0.01	-0.01	0.01	-0.44	1.00																		
17 Town	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	-0.01	-0.01	-0.01	0.00	0.00	-0.36	-0.23	1.00																	
18 Rural	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04	-0.04	-0.04	-0.01	-0.01	-0.43	-0.28	-0.23	1.00																
19 Mean district test score (NAEP scale)	0.02	-0.54	-0.33	-0.11	0.11	0.32	0.54	-0.03	-0.01	0.00	0.01	0.02	0.02	0.00	0.18	-0.06	-0.09	-0.07	1.00															
20 Total district membership	0.11	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.01	0.01	0.00	0.00	0.02	0.19	-0.12	-0.12	-0.01	1.00														
21 Socioeconomic status composite	0.09	-0.01	-0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	-0.01	-0.01	0.40	-0.13	-0.25	-0.12	0.44	0.02	1.00													
22 Per pupil expenditures	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.02	0.00	0.00	-0.01	-0.06	0.24	0.05	-0.16	-0.20	0.09	0.00	0.15	1.00												
23 Gini coefficient	0.16	0.01	0.01	0.00	0.00	-0.01	-0.01	0.00	-0.01	0.00	0.00	-0.01	0.00	0.02	-0.40	0.25	0.24	0.01	-0.30	0.08	-0.76	-0.09	1.00											
24 Pct. White per grade*	-0.04	-0.02	-0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.01	-0.01	-0.02	0.01	-0.03	0.05	-0.22	0.03	0.13	0.32	-0.19	0.42	-0.07	-0.36	1.00										
25 Pct. Hispanic per grade	-0.05	0.02	0.02	0.01	-0.01	-0.02	-0.02	-0.04	-0.03	-0.01	0.02	0.03	-0.02	0.04	0.07	0.20	-0.10	-0.20	-0.18	0.20	-0.04	-0.02	0.05	-0.62	1.00									
26 Pct. Black per grade	0.08	0.00	0.00	-0.01	0.01	0.00	0.00	0.02	0.01	-0.01	-0.01	-0.02	0.01	0.00	-0.20	0.01	0.11	0.12	-0.26	-0.02	-0.58	0.06	0.44	-0.52	-0.31	1.00								
27 Pct. Asian per grade*	0.07	0.01	0.01	0.01	0.00	-0.01	-0.01	-0.02	0.00	-0.01	0.03	0.03	-0.03	0.00	0.23	0.13	-0.19	-0.23	0.19	0.13	0.43	0.17	-0.27	-0.12	0.10	-0.27	1.00							
28 Pct. Native American per grade*	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	-0.01	-0.01	-0.01	-0.07	0.04	0.08	-0.03	-0.04	0.00	-0.05	-0.10	0.05	-0.05	0.01	-0.06	-0.03	1.00						
29 Pct. of students that are ELL	0.05	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01	0.02	-0.07	0.03	0.02	-0.03	0.04	0.05	0.24	-0.11	-0.20	-0.13	0.19	-0.04	-0.02	0.09	-0.50	0.74	-0.23	0.25	0.01	1.00					
30 White-Black difference in family income	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.01	0.01	-0.13	0.06	0.09	0.02	0.01	0.02	-0.04	-0.03	0.24	0.02	-0.09	0.07	-0.01	-0.02	-0.01	1.00				
31 White-Black difference in parent education	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	-0.01	0.00	0.00	-0.23	0.16	0.12	0.00	0.05	0.07	0.00	0.08	0.25	-0.01	-0.03	0.04	0.02	-0.03	0.03	0.49	1.00			
32 White-Black Segregation	0.18	0.09	0.09	0.07	-0.05	-0.10	-0.10	-0.01	-0.01	0.00	0.00	0.00	0.00	0.02	-0.09	0.24	-0.14	-0.02	-0.25	0.40	-0.19	-0.01	0.26	-0.28	0.09	0.23	0.00	0.01	0.12	0.08	0.07	1.00		
33 Pct. enrolled in charter schools	0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.03	-0.02	0.01	0.01	0.04	0.04	0.00	0.17	-0.09	-0.09	-0.10	0.13	-0.16	0.03	0.12	-0.22	0.13	0.12	0.01	0.03	0.12	-0.03	0.04	0.30	1.00	
34 Pct. enrolled in magnet schools	0.07	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	0.00	0.01	0.01	0.00	0.01	0.02	0.15	-0.08	-0.10	-0.05	0.12	-0.10	0.09	0.12	-0.15	0.02	0.15	0.04	-0.02	0.07	-0.01	0.05	0.14	0.16	1.00

\*denotes variable not included in models

**Table 6. Correlations for the Analyses of White-Hispanic Math Test Score Gaps**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	
1 Mean White-Hispanic test score gap	1.00																																							
2 Grade Three	-0.07	1.00																																						
3 Grade Four	-0.06	-0.23	1.00																																					
4 Grade Five	-0.03	-0.23	-0.23	1.00																																				
5 Grade Six	0.02	-0.22	-0.22	-0.22	1.00																																			
6 Grade Seven	0.07	-0.19	-0.19	-0.19	-0.19	1.00																																		
7 Grade Eight*	0.09	-0.19	-0.18	-0.18	-0.18	-0.15	1.00																																	
8 2008-09	0.04	-0.01	-0.01	-0.01	0.00	0.01	0.02	1.00																																
9 2009-10	0.01	0.00	0.00	-0.01	-0.01	0.01	0.01	-0.16	1.00																															
10 2010-11	-0.01	0.00	-0.01	-0.01	-0.01	0.01	0.02	-0.17	-0.18	1.00																														
11 2011-12	-0.02	0.00	0.01	0.01	0.01	-0.02	-0.01	-0.17	-0.18	-0.19	1.00																													
12 2012-13	-0.01	0.00	0.01	0.01	0.01	-0.01	-0.02	-0.17	-0.18	-0.19	-0.19	1.00																												
13 2013-14	-0.02	0.00	0.00	0.00	0.00	0.00	-0.01	-0.14	-0.14	-0.15	-0.15	-0.15	1.00																											
14 2014-15*	0.01	0.01	0.00	0.00	0.00	0.00	-0.02	-0.16	-0.16	-0.17	-0.17	-0.17	-0.14	1.00																										
15 Suburb*	0.06	-0.01	-0.01	-0.01	0.00	0.01	0.01	-0.03	-0.03	-0.03	0.04	0.04	0.02	-0.01	1.00																									
16 Urban	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	-0.01	0.01	-0.41	1.00																								
17 Town	-0.06	0.01	0.01	0.01	0.00	-0.01	-0.01	0.01	0.00	0.00	-0.01	-0.01	0.00	0.01	-0.44	-0.26	1.00																							
18 Rural	-0.15	0.01	0.00	0.00	0.00	-0.01	0.00	0.03	0.04	0.05	-0.05	-0.05	-0.01	-0.02	-0.39	-0.23	-0.24	1.00																						
19 Mean district test score (NAEP scale)	0.20	-0.54	-0.31	-0.07	0.16	0.35	0.53	-0.01	0.00	0.01	0.00	0.01	0.02	-0.03	0.16	-0.07	-0.10	-0.03	1.00																					
20 Total district membership	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.02	0.21	-0.14	-0.09	-0.02	1.00																				
21 Socioeconomic status composite	0.22	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.01	0.02	0.00	-0.01	0.37	-0.23	-0.19	-0.04	0.38	-0.07	1.00																			
22 Per pupil expenditures	0.13	-0.01	-0.01	-0.01	-0.01	0.03	0.03	0.03	0.02	0.00	0.01	0.01	0.01	-0.08	0.25	0.00	-0.16	-0.14	0.12	-0.01	0.18	1.00																		
23 Gini coefficient	0.02	0.01	0.00	0.00	0.00	-0.01	-0.01	0.01	0.01	0.00	-0.01	-0.02	0.00	0.01	-0.35	0.33	0.12	-0.03	-0.26	0.16	-0.74	-0.10	1.00																	
24 Pct. White per grade*	0.01	-0.02	-0.02	-0.02	-0.01	0.05	0.04	0.00	-0.01	0.01	0.01	0.00	0.02	-0.02	0.07	-0.24	0.03	0.13	0.31	-0.18	0.48	-0.03	-0.41	1.00																
25 Pct. Hispanic per grade	-0.04	0.03	0.03	0.03	0.02	-0.07	-0.06	0.00	0.00	0.00	0.00	0.00	-0.03	0.04	-0.12	0.04	0.14	-0.03	-0.28	0.03	-0.31	-0.10	0.21	-0.74	1.00															
26 Pct. Black per grade	-0.02	-0.01	-0.01	-0.02	-0.01	0.03	0.03	0.01	0.02	0.00	-0.01	-0.01	0.03	-0.02	-0.02	0.27	-0.17	-0.07	-0.13	0.20	-0.42	0.14	0.38	-0.42	-0.23	1.00														
27 Pct. Asian per grade*	0.18	0.01	0.01	0.01	0.01	-0.02	-0.02	-0.01	0.00	-0.02	0.01	0.02	-0.03	0.01	0.25	0.10	-0.22	-0.19	0.16	0.09	0.36	0.18	-0.19	-0.14	-0.10	-0.07	1.00													
28 Pct. Native American per grade*	-0.03	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	-0.01	0.00	0.00	-0.12	-0.01	0.15	0.00	-0.06	-0.03	-0.11	-0.11	0.09	-0.07	-0.02	-0.09	-0.07	1.00												
29 Pct. of Hispanic pop. from Central America	0.07	0.00	0.00	-0.01	-0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	-0.02	0.14	0.01	-0.10	-0.08	0.05	0.08	0.07	0.23	0.02	-0.01	-0.14	0.18	0.12	-0.08	1.00											
30 Pct. of Hispanic pop. from Cuba	-0.01	-0.01	-0.01	-0.01	-0.01	0.02	0.02	-0.01	0.00	0.00	0.01	0.01	0.00	-0.02	0.16	-0.03	-0.11	-0.05	0.11	0.10	0.15	0.14	-0.11	0.10	-0.18	0.06	0.13	-0.06	0.09	1.00										
31 Pct. of Hispanic pop. from Mexico	-0.06	0.01	0.01	0.02	0.02	-0.04	-0.04	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01	0.08	-0.35	0.02	0.25	0.16	-0.17	-0.06	-0.21	-0.59	0.16	-0.10	0.28	-0.17	-0.21	0.10	-0.43	-0.34	1.00									
32 Pct. of Hispanic pop. from Puerto Rico	0.03	-0.01	-0.01	-0.02	-0.02	0.03	0.04	0.01	0.00	0.01	0.02	0.02	0.00	-0.05	0.24	0.01	-0.20	-0.11	0.09	0.02	0.05	0.48	-0.07	0.10	-0.24	0.17	0.08	-0.10	0.06	0.14	-0.77	1.00								
33 Pct. of Hispanic pop. from South America	0.07	-0.01	-0.01	-0.01	-0.01	0.03	0.03	0.01	0.01	0.01	0.02	0.02	0.00	-0.06	0.30	-0.05	-0.20	-0.12	0.19	0.03	0.33	0.43	-0.23	0.08	-0.17	0.03	0.25	-0.08	0.18	0.22	-0.58	0.23	1.00							
34 Pct. of students that are ELL	0.09	0.01	0.01	0.02	0.02	-0.04	-0.03	0.03	0.04	-0.09	0.02	0.00	-0.05	0.05	-0.08	0.11	0.05	-0.06	-0.21	0.06	-0.24	-0.09	0.20	-0.54	0.65	-0.11	0.09	0.00	-0.04	-0.15	0.30	-0.24	-0.18	1.00						
35 White-Hispanic difference in family income	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	-0.01	-0.05	0.04	0.03	-0.01	0.06	0.06	0.08	0.07	0.14	-0.04	0.02	0.03	0.05	-0.08	0.05	-0.06	0.03	-0.03	0.02	0.09	1.00					
36 White-Hispanic difference in parent education	0.24	0.01	0.01	0.01	0.01	-0.02	-0.02	0.02	0.01	0.00	-0.01	-0.02	-0.02	0.01	-0.32	0.04	0.26	0.09	-0.14	0.04	-0.22	-0.17	0.29	-0.29	0.37	-0.03	-0.13	0.05	-0.02	-0.23	0.43	-0.38	-0.28	0.43	0.37	1.00				
37 White-Hispanic Segregation	0.19	0.09	0.09	0.07	-0.08	-0.10	-0.10	0.02	0.02	-0.01	-0.01	-0.01	-0.02	0.01	-0.07	0.35	-0.18	-0.08	-0.24	0.41	-0.20	-0.02	0.34	-0.30	0.06	0.34	0.07	0.00	0.10	0.00	0.02	-0.04	-0.04	0.18	0.16	0.20	1.00			
38 Pct. enrolled in charter schools	0.05	0.00	0.00	0.00	0.01	-0.01	0.00	-0.04	-0.03	-0.03	0.00	0.01	0.02	0.07	-0.05	0.17	-0.07	-0.04	-0.09	0.11	-0.17	-0.06	0.18	-0.13	0.04	0.14	-0.01	0.02	-0.02	0.01	0.03	-0.02	-0.07	0.03	-0.01	0.03	0.25	1.00		
39 Pct. enrolled in magnet schools	0.07	0.00	0.00	0.00	0.00	0.00	0.01	-0.01	-0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.16	-0.09	-0.07	-0.06	0.13	-0.16	0.07	0.18	-0.13	-0.04	0.25	0.01	-0.03	0.04	0.04	-0.07	0.07	0.01	0.01	0.02	-0.01	0.17	0.10	1.00	

\*denotes variable not included in models



**Table 7. Correlations for the Analyses of White-Hispanic English Language Arts Test Score Gaps**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	
1 Mean White-Hispanic test score gap	1.00																																							
2 Grade Three	0.05	1.00																																						
3 Grade Four	0.03	-0.21	1.00																																					
4 Grade Five	0.02	-0.21	-0.20	1.00																																				
5 Grade Six	-0.02	-0.20	-0.20	-0.20	1.00																																			
6 Grade Seven	-0.03	-0.20	-0.20	-0.20	-0.20	1.00																																		
7 Grade Eight*	-0.05	-0.20	-0.20	-0.20	-0.19	-0.19	1.00																																	
8 2008-09	0.06	0.00	-0.01	0.00	0.00	0.00	0.01	1.00																																
9 2009-10	0.04	0.00	0.00	0.00	0.00	0.00	0.01	-0.16	1.00																															
10 2010-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.17	-0.17	1.00																														
11 2011-12	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.17	-0.18	-0.19	1.00																													
12 2012-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.17	-0.18	-0.19	-0.20	1.00																												
13 2013-14	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	-0.14	-0.14	-0.15	-0.16	-0.16	1.00																											
14 2014-15*	-0.03	0.01	0.01	0.00	0.00	0.00	-0.02	-0.15	-0.16	-0.17	-0.17	-0.17	-0.14	1.00																										
15 Suburb*	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.02	0.03	0.04	0.01	-0.01	1.00																									
16 Urban	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	-0.02	0.01	-0.41	1.00																								
17 Town	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01	0.01	0.01	-0.44	-0.26	1.00																							
18 Rural	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04	-0.05	-0.04	0.00	-0.01	-0.38	-0.23	-0.25	1.00																						
19 Mean district test score (NAEP scale)	-0.04	-0.54	-0.32	-0.10	0.12	0.33	0.54	-0.03	-0.02	-0.01	0.01	0.03	0.02	0.00	0.19	-0.07	-0.12	-0.04	1.00																					
20 Total district membership	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.21	-0.15	-0.10	-0.01	1.00																				
21 Socioeconomic status composite	0.11	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.01	0.02	-0.01	-0.01	0.37	-0.22	-0.19	-0.03	0.42	-0.07	1.00																			
22 Per pupil expenditures	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.01	0.00	0.00	0.01	-0.07	0.23	0.00	-0.15	-0.13	0.12	-0.01	0.17	1.00																		
23 Gini coefficient	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	-0.01	-0.02	0.00	0.01	-0.34	0.32	0.13	-0.04	-0.28	0.15	-0.74	-0.10	1.00																	
24 Pct. White per grade*	-0.09	-0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.02	-0.02	0.07	-0.24	0.03	0.13	0.32	-0.18	0.47	-0.01	-0.40	1.00																
25 Pct. Hispanic per grade	0.06	0.01	0.01	0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.01	-0.03	0.03	-0.12	0.04	0.13	-0.03	-0.30	0.04	-0.32	-0.11	0.22	-0.75	1.00															
26 Pct. Black per grade	0.01	-0.01	-0.01	-0.01	0.01	0.01	0.00	0.02	0.01	-0.01	-0.01	-0.02	0.03	-0.02	-0.02	0.27	-0.17	-0.07	-0.13	0.19	-0.41	0.14	0.37	-0.39	-0.23	1.00														
27 Pct. Asian per grade*	0.11	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.01	-0.01	0.02	0.02	-0.04	0.00	0.25	0.11	-0.22	-0.19	0.19	0.09	0.36	0.15	-0.19	-0.14	-0.10	-0.07	1.00													
28 Pct. Native American per grade*	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	-0.01	0.00	-0.01	-0.12	-0.01	0.15	0.00	-0.07	-0.03	-0.11	-0.11	0.09	-0.06	-0.03	-0.09	-0.07	1.00												
29 Pct. of Hispanic pop. from Central America	0.06	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01	0.00	0.00	0.00	-0.02	0.14	0.01	-0.11	-0.07	0.07	0.08	0.08	0.22	0.01	0.00	-0.15	0.19	0.12	-0.08	1.00												
30 Pct. of Hispanic pop. from Cuba	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	-0.02	0.16	-0.03	-0.11	-0.05	0.13	0.11	0.15	0.14	-0.11	0.11	-0.19	0.06	0.12	-0.06	0.10	1.00										
31 Pct. of Hispanic pop. from Mexico	0.06	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.08	-0.35	0.02	0.25	0.15	-0.19	-0.07	-0.21	-0.58	0.16	-0.12	0.30	-0.19	-0.19	0.10	-0.44	-0.34	1.00									
32 Pct. of Hispanic pop. from Puerto Rico	-0.08	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-0.05	0.24	0.01	-0.19	-0.10	0.10	0.02	0.05	0.47	-0.08	0.11	-0.25	0.19	0.06	-0.10	0.07	0.14	-0.77	1.00								
33 Pct. of Hispanic pop. from South America	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	-0.06	0.30	-0.05	-0.20	-0.12	0.20	0.04	0.33	0.43	-0.23	0.09	-0.19	0.04	0.24	-0.08	0.20	0.23	-0.59	0.24	1.00							
34 Pct. of students that are ELL	0.19	-0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.06	-0.11	0.03	0.01	-0.06	0.04	-0.08	0.11	0.04	-0.07	-0.22	0.07	-0.24	-0.09	0.20	-0.55	0.64	-0.12	0.10	0.00	-0.03	-0.15	0.29	-0.25	-0.18	1.00						
35 White-Hispanic difference in family income	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	-0.05	0.05	0.03	-0.01	0.04	0.06	0.08	0.07	0.14	-0.04	0.02	0.03	0.05	-0.08	0.05	-0.06	0.03	-0.03	0.02	0.09	1.00						
36 White-Hispanic difference in parent education	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	-0.01	-0.01	-0.02	0.01	-0.32	0.05	0.25	0.08	-0.17	0.04	-0.22	-0.16	0.29	-0.29	0.37	-0.04	-0.12	0.04	-0.03	-0.23	0.43	-0.38	-0.28	0.43	0.37	1.00				
37 White-Hispanic Segregation	0.31	0.10	0.10	0.08	-0.06	-0.11	-0.11	0.03	0.02	0.00	-0.01	-0.01	-0.02	0.00	-0.06	0.35	-0.18	-0.09	-0.25	0.41	-0.19	-0.01	0.33	-0.28	0.06	0.32	0.07	0.00	0.10	0.00	0.01	-0.03	-0.03	0.18	0.17	0.20	1.00			
38 Pct. enrolled in charter schools	0.06	0.00	0.00	0.00	0.00	0.00	-0.04	-0.03	-0.02	0.00	0.01	0.02	0.06	-0.05	0.16	-0.07	-0.03	-0.07	0.10	-0.15	-0.06	0.17	-0.12	0.04	0.12	0.00	0.02	-0.03	0.01	0.03	-0.02	-0.06	0.02	-0.01	0.03	0.23	1.00			
39 Pct. enrolled in magnet schools	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.16	-0.09	-0.07	-0.05	0.15	-0.15	0.06	0.17	-0.13	-0.04	0.26	0.02	-0.03	0.05	0.04	-0.07	0.07	0.01	0.02	0.03	-0.01	0.18	0.09	1.00	

\*denotes variable not included in models

**Table 8. Results for Three-Level Random Intercept Models Examining the Association Between District-Level Charter and Magnet School Enrollment and White-Black Test Score Gaps**

Random Intercept Models of White-Black Test Score Gaps						
	Math			English Language Arts		
	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.
Grade 3	-1.91 ***	0.23	-0.08	1.83 ***	0.30	0.07
Grade 4	-1.44 ***	0.19	-0.06	2.12 ***	0.24	0.08
Grade 5	-1.45 ***	0.15	-0.06	1.33 ***	0.19	0.05
Grade 6	-0.75 ***	0.12	-0.03	0.85 ***	0.14	0.03
Grade 7	-0.39 ***	0.09	-0.02	0.35 ***	0.10	0.01
2008-09	-0.09	0.09	-0.003	-0.50 ***	0.10	-0.02
2009-10	-0.46 ***	0.09	-0.02	-0.68 ***	0.10	-0.02
2010-11	-0.52 ***	0.09	-0.02	-0.47 ***	0.10	-0.02
2011-12	-0.66 ***	0.09	-0.03	-0.79 ***	0.09	-0.03
2012-13	-0.34 ***	0.09	-0.01	-0.04	0.09	-0.001
2013-14	-0.33 ***	0.09	-0.01	-0.04	0.10	-0.001
Urban	0.58 ***	0.18	0.03	0.61 **	0.20	0.02
Town	-0.43 *	0.18	-0.02	-0.46 *	0.20	-0.02
Rural	-0.41 **	0.16	-0.02	-0.61 ***	0.17	-0.02
Mean district test performance (NAEP scale)	0.06 ***	0.004	0.13	0.01	0.01	0.01
Total district membership/1000	0.02 ***	0.00	0.05	0.02 ***	0.00	0.05
Socioeconomic status composite	3.77 ***	0.17	0.41	4.05 ***	0.20	0.39
Per pupil expenditures/1000	0.05 **	0.02	0.02	0.01	0.02	0.004
Gini coefficient	47.18 ***	3.07	0.26	58.83 ***	3.61	0.29
Percent Hispanic per grade	0.21 **	0.07	0.04	0.11	0.07	0.02
Percent Black per grade	0.42 ***	0.06	0.09	0.49 ***	0.06	0.09
Percent of students that are ELL	0.22 *	0.09	0.02	0.21 *	0.09	0.02
White-Black difference in family income	1.93 ***	0.23	0.09	2.25 ***	0.27	0.10
White-Black difference in parent education	6.69 ***	0.31	0.25	8.90 ***	0.37	0.30
Percent enrolled in charter schools	0.29 ***	0.08	0.02	0.32 ***	0.09	0.02
Percent enrolled in magnet schools	0.10	0.05	0.01	-0.01	0.06	-0.002
Intercept	-15.33 ***	1.69	0.02	-7.95 ***	1.97	-0.02
District Variance	18.83	0.60		26.72	0.85	
State Variance	7.16	1.90		8.28	2.28	
Residual Variance	37.13	0.19		47.92	0.24	
$\chi^2$	27329.33 ***			29979.78 ***		

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Note: Percentage variables are scaled in ten percent units.

**Table 9. Results for Three-Level Fixed Effects Models Examining the Association Between District-Level Charter and Magnet School Enrollment and White-Black Test Score Gaps**

	Math			English Language Arts		
	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.
Grade 3	-0.02	0.07	-0.001	-0.01	0.08	0.000
Grade 4	-0.01	0.07	-0.001	-0.003	0.08	0.000
Grade 5	-0.01	0.07	0.000	0.000	0.08	0.000
Grade 6	-0.02	0.07	-0.001	-0.003	0.08	0.000
Grade 7	-0.01	0.07	-0.001	-0.001	0.08	0.000
2008-09	0.11	0.09	0.01	-0.30 **	0.10	-0.02
2009-10	-0.25 **	0.08	-0.02	-0.48 ***	0.10	-0.03
2010-11	-0.43 ***	0.08	-0.03	-0.39 ***	0.09	-0.02
2011-12	-0.54 ***	0.08	-0.04	-0.69 ***	0.09	-0.04
2012-13	-0.25 ***	0.08	-0.02	0.003	0.09	0.000
2013-14	-0.28 ***	0.08	-0.02	-0.01	0.09	-0.001
Urban	-0.02	0.06	-0.001	-0.02	0.06	-0.001
Town	-0.03	0.06	-0.002	-0.02	0.07	-0.001
Rural	0.01	0.06	0.000	-0.02	0.06	-0.002
<b>Mean district test performance (NAEP scale)</b>	0.03 ***	0.005	0.03	0.02 ***	0.01	0.01
<b>Total district membership/1000</b>	0.07 ***	0.02	0.01	0.05 *	0.02	0.01
<b>Per pupil expenditures/1000</b>	0.03	0.02	0.01	-0.01	0.02	-0.003
<b>Percent Black per grade</b>	-0.26 **	0.09	-0.01	-0.18	0.11	-0.01
<b>Percent Hispanic per grade</b>	0.56 ***	0.11	0.02	0.40 ***	0.12	0.01
<b>Percent of students that are ELL</b>	0.07	0.08	0.003	0.09	0.08	0.004
<b>Percent enrolled in charter schools</b>	0.30 ***	0.08	0.01	0.27 **	0.09	0.01
<b>Percent enrolled in magnet schools</b>	-0.03	0.05	-0.002	-0.14 *	0.06	-0.01
Socioeconomic status composite	-0.005	0.03	-0.001	-0.005	0.04	-0.001
Gini coefficient	0.00	0.66	0.000	0.05	0.74	0.000
White-Black difference in family income	-0.01	0.05	-0.001	-0.01	0.06	-0.001
White-Black difference in parent education	0.02	0.07	0.001	0.01	0.08	0.001
Intercept	0.27	0.26	0.000	0.29	0.29	0.000
District Variance	0.000	0.000		0.000	0.000	
State Variance	0.000	0.000		0.000	0.000	
Residual Variance	28.56	0.15		38.77	0.19	
$\chi^2$	ns			ns		

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Notes: Variables in bold control for the fixed effects of district means for a given grade from 2008-09 to 2014-15.

Percentage variables are scaled in ten percent units.

**Table 10. Results for Three-Level Random Intercept Models Examining the Association Between District-Level Charter and Magnet School Enrollment and White-Hispanic Test Score Gaps**

Random Intercept Models of White-Hispanic Test Score Gaps						
	Math			English Language Arts		
	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.
Grade 3	-1.87 ***	0.21	-0.08	2.18 ***	0.28	0.08
Grade 4	-1.90 ***	0.18	-0.08	1.82 ***	0.23	0.06
Grade 5	-1.65 ***	0.14	-0.07	1.43 ***	0.18	0.05
Grade 6	-0.96 ***	0.11	-0.04	0.57 ***	0.14	0.02
Grade 7	-0.29 ***	0.09	-0.01	0.37 ***	0.10	0.01
2008-09	0.76 ***	0.08	0.03	2.54 ***	0.10	0.08
2009-10	0.08	0.08	0.003	1.99 ***	0.09	0.06
2010-11	-0.39 ***	0.08	-0.02	1.27 ***	0.09	0.04
2011-12	-0.86 ***	0.08	-0.03	0.15	0.09	0.01
2012-13	-0.50 ***	0.08	-0.02	1.09 ***	0.09	0.04
2013-14	-0.39 ***	0.08	-0.01	0.95 ***	0.10	0.03
Urban	0.67 ***	0.16	0.03	0.81 ***	0.19	0.03
Town	-0.28	0.15	-0.01	-0.22	0.18	-0.01
Rural	-0.29 *	0.14	-0.01	-0.19	0.16	-0.01
Mean district test performance (NAEP scale)	0.02 ***	0.004	0.05	-0.01	0.005	-0.02
Total district membership/1000	0.02 ***	0.00	0.06	0.03 ***	0.00	0.06
Socioeconomic status composite	4.70 ***	0.17	0.47	5.24 ***	0.20	0.44
Per pupil expenditures/1000	0.02	0.01	0.01	0.03	0.02	0.01
Gini coefficient	52.28 ***	2.60	0.29	64.07 ***	3.13	0.30
Percent Hispanic per grade	0.05	0.05	0.01	0.21 ***	0.06	0.04
Percent Black per grade	0.40 ***	0.07	0.07	0.48 ***	0.08	0.07
Percent of Hispanic population from Central America	0.09	0.13	0.01	0.30	0.15	0.03
Percent of Hispanic population from Cuba	-0.24	0.23	-0.01	-0.06	0.28	-0.002
Percent of Hispanic population from Mexico	-0.11	0.09	-0.04	0.08	0.11	0.02
Percent of Hispanic population from Puerto Rico	0.28 **	0.10	0.06	0.30 *	0.13	0.05
Percent of Hispanic population from South America	0.10	0.14	0.01	0.28	0.18	0.02
Percent of students that are ELL	0.20 ***	0.05	0.02	0.22 ***	0.06	0.02
White-Hispanic difference in family income	2.35 ***	0.20	0.11	2.69 ***	0.25	0.11
White-Hispanic difference in parent education	5.75 ***	0.27	0.25	8.58 ***	0.32	0.31
Percent enrolled in charter schools	0.07	0.07	0.005	0.14	0.08	0.01
Percent enrolled in magnet schools	0.14 **	0.05	0.02	0.15 *	0.06	0.01
Intercept	-16.01 ***	1.68	0.03	-18.04 ***	2.01	0.02
District Variance	20.14	0.57		29.77	0.83	
State Variance	6.78	1.64		4.61	1.16	
Residual Variance	34.85	0.17		50.06	0.23	
$\chi^2$	36837.60 ***			35435.44 ***		

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Note: Percentage variables are scaled in ten percent units.

**Table 11. Results for Three-Level Fixed Effects Models Examining the Association Between District-Level Charter and Magnet School Enrollment and White-Hispanic Test Score Gaps**

	Math			English Language Arts		
	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.
Grade 3	0.03	0.06	0.002	0.03	0.07	0.002
Grade 4	0.03	0.06	0.002	0.03	0.07	0.002
Grade 5	0.03	0.06	0.002	0.02	0.07	0.001
Grade 6	0.02	0.06	0.002	0.02	0.07	0.001
Grade 7	-0.003	0.07	0.000	0.01	0.07	0.001
2008-09	0.53 ***	0.08	0.03	2.14 ***	0.09	0.12
2009-10	-0.08	0.07	-0.01	1.65 ***	0.09	0.09
2010-11	-0.52 ***	0.07	-0.04	1.00 ***	0.08	0.06
2011-12	-0.86 ***	0.07	-0.06	0.01	0.08	0.000
2012-13	-0.50 ***	0.06	-0.04	0.94 ***	0.08	0.05
2013-14	-0.36 ***	0.07	-0.02	0.89 ***	0.08	0.04
Urban	-0.03	0.05	-0.002	-0.01	0.06	-0.001
Town	-0.05	0.05	-0.004	-0.03	0.06	-0.002
Rural	-0.01	0.05	-0.001	0.05	0.06	0.003
<b>Mean district test performance (NAEP scale)</b>	0.01 **	0.004	0.01	0.01	0.01	0.004
<b>Total district membership/1000</b>	0.07 ***	0.02	0.01	0.11 ***	0.02	0.02
<b>Per pupil expenditures/1000</b>	-0.02	0.01	-0.01	-0.02	0.02	-0.003
<b>Percent Black per grade</b>	0.12	0.13	0.003	0.28	0.15	0.01
<b>Percent Hispanic per grade</b>	-0.21 **	0.07	-0.01	-0.22 **	0.08	-0.01
<b>Percent of students that are ELL</b>	0.10 *	0.05	0.01	0.09	0.05	0.01
<b>Percent enrolled in charter schools</b>	-0.04	0.07	-0.002	-0.05	0.08	-0.002
<b>Percent enrolled in magnet schools</b>	0.03	0.05	0.002	-0.04	0.06	-0.002
Socioeconomic status composite	-0.002	0.03	0.000	0.02	0.04	0.003
Gini coefficient	-0.05	0.30	-0.001	-0.23	0.36	-0.003
Percent of Hispanic population from Central America	-0.01	0.06	-0.001	0.02	0.07	0.002
Percent of Hispanic population from Cuba	-0.001	0.03	0.000	0.01	0.03	0.001
Percent of Hispanic population from Mexico	0.001	0.05	0.000	0.003	0.06	0.000
Percent of Hispanic population from Puerto Rico	-0.004	0.02	-0.002	0.01	0.02	0.005
Percent of Hispanic population from South America	-0.003	0.02	-0.001	-0.002	0.02	0.000
White-Hispanic difference in family income	-0.002	0.05	0.000	-0.004	0.01	0.000
White-Hispanic difference in parent education	-0.02	0.06	-0.001	-0.06	0.01	-0.004
Intercept	0.35	0.27	0.000	-1.04 ***	0.32	0.000
District Variance	0.000	0.000		0.000	0.000	
State Variance	0.000	0.000		0.000	0.000	
Residual Variance	26.54	0.13		39.53	0.18	
$\chi^2$	ns			ns		

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Notes: Variables in bold control for the fixed effects of district means for a given grade from 2008-09 to 2014-15.

Percentage variables are scaled in ten percent units.

**Table 12. Between-District Results for Two-Level Mediation Models with a State-Level Cluster Adjustment Examining the Indirect Effect of White-Black Segregation on the Association Between District-Level Charter and Magnet School Enrollment and White-Black Test Score Gaps**

	Math						English Language Arts					
	Predicting White-Black Segregation			Predicting White-Black Test Score Gap			Predicting White-Black Segregation			Predicting White-Black Test Score Gap		
	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.
Urban	0.03 ***	0.005	0.10	0.68 *	0.33	0.04	0.03 ***	0.005	0.10	1.23 ***	0.38	0.06
Town	-0.03 ***	0.01	-0.11	-1.39 *	0.56	-0.07	-0.03 ***	0.01	-0.11	-0.20	0.55	-0.01
Rural	0.01	0.01	0.04	-3.14 ***	0.62	-0.17	0.01	0.01	0.05	-1.41 *	0.68	-0.07
Mean district test performance (NAEP scale)	-0.001	0.000	-0.08	0.11 *	0.04	0.18	0.000	0.001	-0.05	0.10	0.05	0.14
Total district membership/1000	0.002 ***	0.000	0.35	-0.001	0.00	-0.003	0.001 ***	0.000	0.35	0.00	0.01	0.00
Socioeconomic status composite	0.01 *	0.01	0.14	2.92 ***	0.29	0.44	0.01	0.01	0.13	3.30 ***	0.40	0.43
Per pupil expenditures/1000	-0.001	0.001	-0.04	-0.07	0.08	-0.04	-0.001	0.001	-0.04	-0.18 *	0.07	-0.08
Gini coefficient	0.35 ***	0.09	0.18	33.39 ***	3.23	0.26	0.34 ***	0.09	0.18	46.48 ***	4.46	0.31
Percent Hispanic per grade	-0.002	0.002	-0.04	-0.48 *	0.22	-0.14	-0.002	0.002	-0.03	-0.38 *	0.17	-0.10
Percent Black per grade	0.01 ***	0.002	0.19	0.54 ***	0.16	0.16	0.01 ***	0.002	0.20	0.94 ***	0.17	0.24
Percent of students that are ELL	0.01 **	0.004	0.08	1.53 ***	0.44	0.18	0.01 *	0.004	0.07	1.68 **	0.56	0.17
White-Black difference in family income	0.01 *	0.00	0.05	2.19 ***	0.40	0.16	0.01 *	0.01	0.05	2.61 ***	0.42	0.16
White-Black difference in parent education	-0.01	0.01	-0.03	6.28 ***	0.46	0.33	-0.01	0.01	-0.03	8.53 ***	0.57	0.39
Percent enrolled in charter schools	0.03 ***	0.006	0.22	0.19	0.23	0.02	0.03 ***	0.01	0.22	-0.07	0.25	-0.01
Percent enrolled in magnet schools	0.001	0.002	0.011	0.29 ***	0.07	0.05	0.001	0.002	0.01	0.18	0.14	0.03
White-Black segregation				9.31 ***	1.47	0.14				10.74 ***	1.85	0.14
Intercept	0.05	0.10	0.47	-21.70	11.84	-3.21	-0.03	0.12	-0.27	-22.98	11.78	-2.93
Residual Variance	0.01 ***	0.001	0.63	21.75 ***	1.23	0.48	0.01 ***	0.001	0.63	29.17 ***	1.65	0.47
<b>Indirect Effects</b>												
Charter school enrollment and white-black segregation				0.30 ***	0.07	0.03				0.35 ***	0.09	0.03
Magnet school enrollment and white-black segregation				0.01	0.02	0.002				0.01	0.02	0.002
R <sup>2</sup>	0.37 ***	0.02		0.53 ***	0.02		0.37 ***	0.03		0.53 ***	0.03	
<b>Fit Indices</b>												
Degrees of freedom	0.000						0.000					
Chi-Square	0.000						0.000					
Comparative Fit Index (CFI)	1.00						1.00					
Tucker-Lewis Index (TLI)	1.00						1.00					
Root Mean Square Error of Approximation (RMSEA)	0.000						0.000					
Standardized Root Mean Square Residual (SRMR)	0.000						0.000					

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$

**Table 13. Within-District Results for Two-Level Mediation Models with a State-Level Cluster Adjustment Examining the Indirect Effect of White-Black Segregation on the Association Between District-Level Charter and Magnet School Enrollment and White-Black Test Score Gaps**

	Math						English Language Arts					
	Predicting White-Black Segregation			Predicting White-Black Test Score Gap			Predicting White-Black Segregation			Predicting White-Black Test Score Gap		
	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.
Grade 3	0.06 ***	0.004	0.56	-2.33 *	1.04	-0.14	0.07 ***	0.01	0.60	1.03	1.26	0.06
Grade 4	0.06 ***	0.004	0.52	-1.78	0.94	-0.11	0.07 ***	0.01	0.55	1.44	1.01	0.08
Grade 5	0.05 ***	0.003	0.44	-1.71 **	0.65	-0.10	0.06 ***	0.004	0.47	0.79	0.80	0.04
Grade 6	0.02 ***	0.002	0.15	-0.91	0.54	-0.06	0.02 ***	0.003	0.18	0.57	0.57	0.03
Grade 7	0.004 ***	0.001	0.03	-0.47	0.37	-0.03	0.01 ***	0.001	0.04	0.23	0.27	0.01
2008-09	0.01 ***	0.002	0.05	-0.07	0.39	-0.004	0.01 ***	0.002	0.05	-0.52	0.55	-0.03
2009-10	0.004 **	0.002	0.03	-0.44	0.38	-0.03	0.01 ***	0.002	0.04	-0.71	0.53	-0.04
2010-11	0.002	0.001	0.02	-0.57	0.34	-0.03	0.003 *	0.001	0.02	-0.56	0.43	-0.03
2011-12	0.000	0.001	0.003	-0.65	0.44	-0.04	0.001	0.001	0.01	-0.82	0.75	-0.04
2012-13	-0.001	0.001	-0.004	-0.34	0.29	-0.02	0.000	0.001	-0.001	-0.06	0.44	-0.003
2013-14	0.000	0.001	-0.003	-0.32	0.21	-0.02	0.000	0.000	-0.002	-0.04	0.34	-0.002
Urban	0.000	0.002	-0.001	0.07	0.29	0.001	0.000	0.002	-0.001	-0.05	0.30	-0.001
Town	0.001	0.002	0.003	-0.15	0.26	-0.003	0.000	0.002	0.001	-0.19	0.34	-0.004
Rural	0.001	0.002	0.003	0.07	0.23	0.002	0.001	0.002	0.002	-0.16	0.26	-0.004
Mean district test performance (NAEP scale)	0.000 ***	0.000	0.16	0.05 **	0.02	0.15	0.000 ***	0.000	0.21	-0.004	0.02	-0.01
Total district membership/1000	0.001	0.000	0.01	0.07	0.04	0.01	0.000	0.000	0.01	0.05	0.07	0.01
Per pupil expenditures/1000	0.000	0.000	-0.01	0.03	0.02	0.01	0.000	0.000	-0.004	-0.02	0.04	-0.004
Percent Hispanic per grade	0.01 ***	0.002	0.04	0.21	0.24	0.01	0.01 ***	0.002	0.04	0.06	0.29	0.002
Percent Black per grade	-0.001	0.004	-0.003	-0.21	0.28	-0.01	-0.001	0.004	-0.01	-0.31	0.30	-0.01
Percent of students that are ELL	-0.002	0.001	-0.01	0.11	0.13	0.004	-0.002	0.001	-0.01	0.12	0.12	0.01
Percent enrolled in charter schools	0.01 **	0.005	0.07	0.29	0.20	0.01	0.01 **	0.005	0.07	0.22	0.18	0.01
Percent enrolled in magnet schools	0.001	0.000	0.01	-0.03	0.09	-0.002	0.001	0.001	0.01	-0.17	0.10	-0.01
White-Black segregation				-0.84	1.03	-0.01				3.06 *	1.23	0.02
Residual Variance	0.001 ***	0.000	0.78	37.08 ***	1.46	0.93	0.001 ***	0.000	0.77	47.82 ***	1.98	0.99
<b>Indirect Effects</b>												
Charter school enrollment and white-black segregation				-0.01	0.02	0.000				0.04 *	0.02	0.001
Magnet school enrollment and white-black segregation				-0.001	0.001	0.000				0.003	0.002	0.000
R <sup>2</sup>	0.22 ***	0.02		0.07 ***	0.01		0.23 ***	0.02		0.01 *	0.01	
<b>Fit Indices</b>												
Degrees of freedom	0.000						0.000					
Chi-Square	0.000						0.000					
Comparative Fit Index (CFI)	1.00						1.00					
Tucker-Lewis Index (TLI)	1.00						1.00					
Root Mean Square Error of Approximation (RMSEA)	0.000						0.000					
Standardized Root Mean Square Residual (SRMR)	0.000						0.000					

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$

**Table 14. Between-District Results for Two-Level Mediation Models with a State-Level Cluster Adjustment Examining the Indirect Effect of White-Hispanic Segregation on the Association Between District-Level Charter and Magnet School Enrollment and White-Hispanic Test Score Gaps**

	Math						English Language Arts					
	Predicting White-Hispanic Segregation			Predicting White-Hispanic Test Score Gap			Predicting White-Hispanic Segregation			Predicting White-Hispanic Test Score Gap		
	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.
Urban	0.03 ***	0.004	0.13	1.58 ***	0.27	0.09	0.03 ***	0.004	0.13	1.83 ***	0.33	0.08
Town	-0.03 ***	0.00	-0.13	0.17	0.49	0.01	-0.03 ***	0.00	-0.13	1.40 *	0.62	0.07
Rural	-0.01	0.01	-0.05	-2.68 ***	0.52	-0.14	-0.01	0.01	-0.05	-0.74	0.63	-0.03
Mean district test performance (NAEP scale)	0.000	0.000	-0.07	0.06	0.04	0.09	0.000	0.000	-0.06	0.09 ***	0.03	0.13
Total district membership/1000	0.001 ***	0.000	0.29	-0.01	0.01	-0.03	0.001 ***	0.000	0.29	-0.02 **	0.01	-0.04
Socioeconomic status composite	0.01 ***	0.003	0.14	3.72 ***	0.33	0.51	0.01 ***	0.003	0.13	4.06 ***	0.53	0.47
Per pupil expenditures/1000	-0.001	0.001	-0.06	0.11	0.08	0.07	-0.001	0.001	-0.06	0.09	0.07	0.05
Gini coefficient	0.27 ***	0.05	0.18	30.92 ***	4.51	0.24	0.26 ***	0.05	0.18	44.54 ***	5.86	0.29
Percent Hispanic per grade	-0.003 ***	0.001	-0.09	-0.28 **	0.10	-0.09	-0.003 **	0.001	-0.08	-0.07	0.15	-0.02
Percent Black per grade	0.01 ***	0.001	0.20	-0.26	0.24	-0.06	0.01 ***	0.001	0.20	0.10	0.18	0.02
Percent of Hispanic population from Central America	-0.001	0.003	-0.01	-0.02	0.13	-0.003	-0.001	0.003	-0.01	0.26	0.18	0.03
Percent of Hispanic population from Cuba	-0.003	0.004	-0.02	-0.48	0.34	-0.03	-0.002	0.004	-0.01	-0.23	0.39	-0.01
Percent of Hispanic population from Mexico	-0.004	0.002	-0.16	0.01	0.12	0.003	-0.004	0.002	-0.15	0.28 *	0.11	0.11
Percent of Hispanic population from Puerto Rico	-0.004	0.003	-0.11	0.37 **	0.13	0.11	-0.004	0.003	-0.11	0.45 **	0.16	0.11
Percent of Hispanic population from South America	-0.004	0.003	-0.04	-0.01	0.19	-0.001	-0.004	0.003	-0.04	0.19	0.20	0.02
Percent of students that are ELL	0.01 ***	0.003	0.17	0.88 **	0.33	0.12	0.01 ***	0.002	0.16	1.49 ***	0.31	0.17
White-Hispanic difference in family income	0.01 ***	0.002	0.05	2.21 ***	0.25	0.15	0.01 ***	0.002	0.04	2.51 ***	0.31	0.14
White-Hispanic difference in parent education	0.03 ***	0.004	0.14	5.31 ***	0.43	0.33	0.03 ***	0.004	0.14	7.44 ***	0.49	0.38
Percent enrolled in charter schools	0.02 ***	0.005	0.16	0.55 *	0.26	0.06	0.02 ***	0.01	0.16	0.36 **	0.14	0.03
Percent enrolled in magnet schools	0.002	0.002	0.03	0.40 *	0.16	0.06	0.003	0.002	0.03	0.36 *	0.19	0.04
White-Hispanic segregation				18.79 ***	2.65	0.21				29.10 ***	2.88	0.27
Intercept	0.04	0.08	0.50	-17.62	13.59	-2.60	0.001	0.05	0.01	-34.66 ***	7.95	-4.28
Residual Variance	0.003 ***	0.000	0.55	23.10 ***	1.59	0.50	0.003 ***	0.000	0.542	29.26 ***	1.12	0.45
<b>Indirect Effects</b>												
Charter school enrollment and white-Hispanic segregation				0.33 **	0.11	0.03				0.53 ***	0.15	0.04
Magnet school enrollment and white-Hispanic segregation				0.04	0.04	0.01				0.07	0.07	0.01
R <sup>2</sup>	0.46 ***	0.04		0.50 ***	0.04		0.46 ***	0.04		0.56 ***	0.02	
<b>Fit Indices</b>												
Degrees of freedom	0.000						0.000					
Chi-Square	0.000						0.060 *					
Comparative Fit Index (CFI)	1.00						1.00					
Tucker-Lewis Index (TLI)	1.00						1.00					
Root Mean Square Error of Approximation (RMSEA)	0.000						0.000					
Standardized Root Mean Square Residual (SRMR)	0.000						0.000					

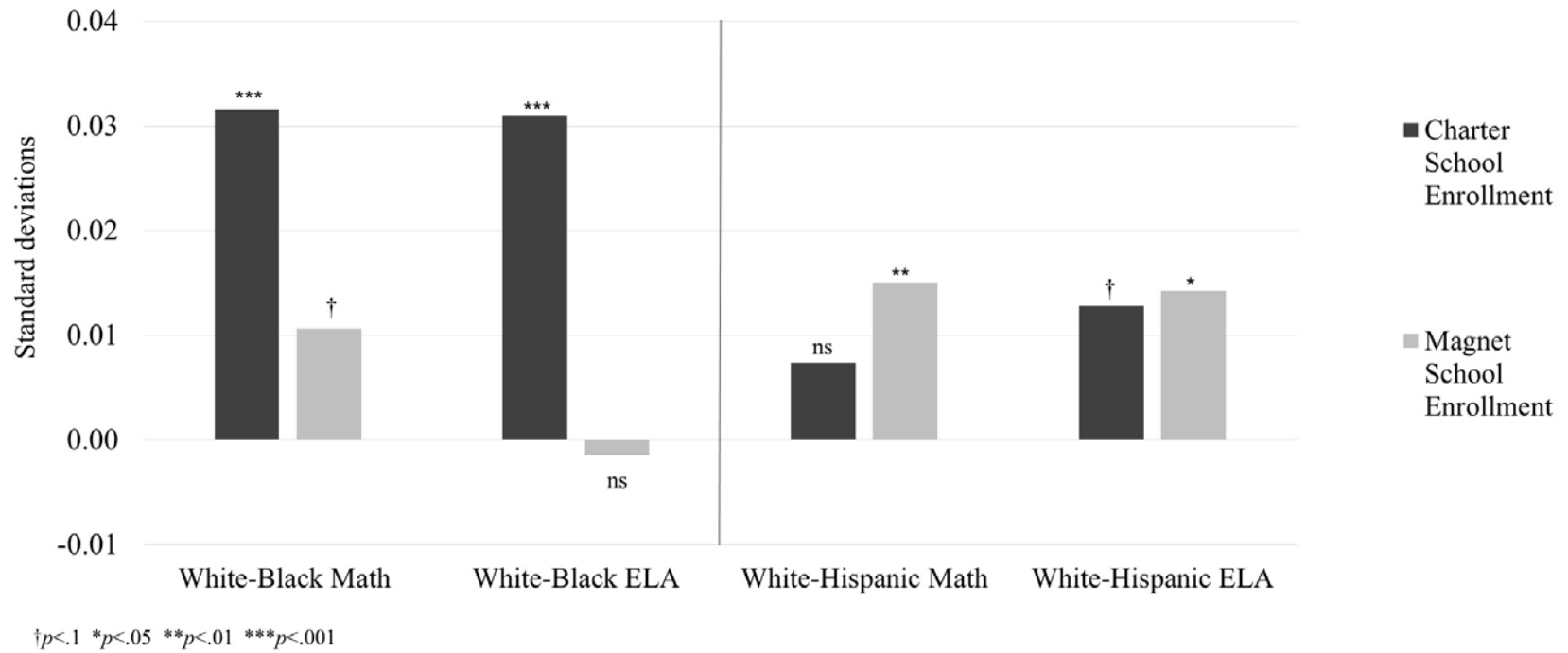
\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$



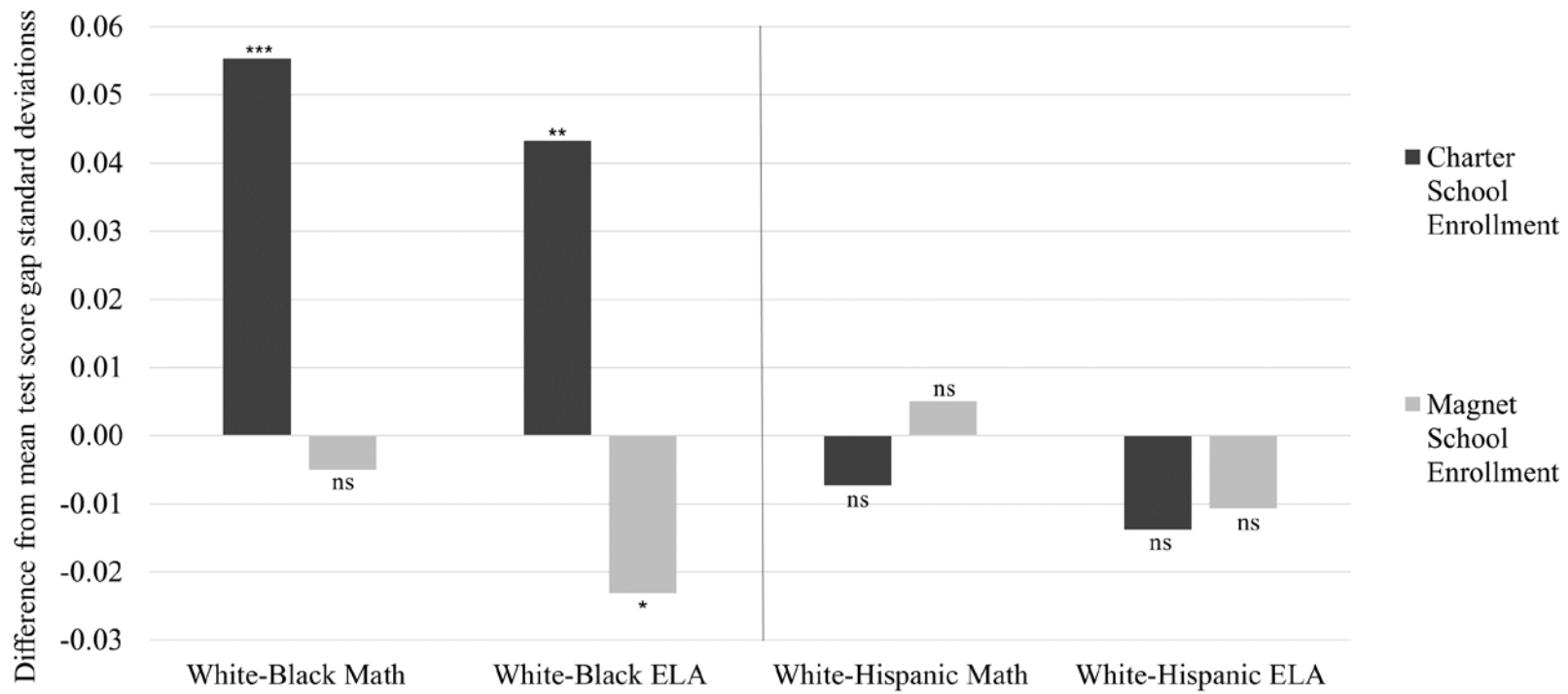
**Table 15. Within-District Results for Two-Level Mediation Models with a State-Level Cluster Adjustment Examining the Indirect Effect of White-Hispanic Segregation on the Association Between District-Level Charter and Magnet School Enrollment and White-Hispanic Test Score Gaps**

	Math						English Language Arts					
	Predicting White-Hispanic Segregation			Predicting White-Hispanic Test Score			Predicting White-Hispanic Segregation			Predicting White-Hispanic Test Score		
				Gap						Gap		
	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.	Coeff.	SE	Standardized Coeff.
Grade 3	0.06 ***	0.003	0.58	-2.07	1.11	-0.13	0.06 ***	0.003	0.61	1.23	1.35	0.07
Grade 4	0.05 ***	0.003	0.54	-2.05 *	0.97	-0.13	0.06 ***	0.003	0.56	1.01	0.94	0.05
Grade 5	0.05 ***	0.002	0.46	-1.76 *	0.71	-0.11	0.05 ***	0.003	0.48	0.77	0.66	0.04
Grade 6	0.02 ***	0.001	0.16	-1.06	0.56	-0.07	0.02 ***	0.002	0.17	0.25	0.48	0.01
Grade 7	0.00 ***	0.001	0.03	-0.34	0.28	-0.02	0.004 ***	0.001	0.04	0.24	0.28	0.01
2008-09	0.01 ***	0.001	0.09	0.49 *	0.24	0.03	0.01 ***	0.002	0.08	2.13 ***	0.48	0.10
2009-10	0.01 ***	0.001	0.07	-0.15	0.24	-0.01	0.01 ***	0.001	0.06	1.65 ***	0.49	0.08
2010-11	0.003 ***	0.001	0.03	-0.60 **	0.22	-0.04	0.003 *	0.001	0.02	0.96 *	0.46	0.05
2011-12	0.001	0.001	0.01	-0.97 *	0.39	-0.06	0.001	0.001	0.01	-0.01	1.31	-0.001
2012-13	0.000	0.000	0.001	-0.58 ***	0.18	-0.04	0.000	0.000	-0.001	0.98 **	0.31	0.05
2013-14	-0.001	0.000	-0.01	-0.43 ***	0.13	-0.02	-0.001	0.000	-0.01	0.89 **	0.33	0.04
Urban	0.000	0.002	-0.001	-0.32	0.26	-0.01	0.000	0.002	0.001	-0.35	0.30	-0.01
Town	-0.002	0.001	-0.01	-0.31	0.20	-0.01	-0.002	0.001	-0.01	-0.24	0.24	-0.01
Rural	-0.002	0.001	-0.01	-0.09	0.23	-0.003	-0.001	0.001	-0.01	0.02	0.25	0.000
Mean district test performance (NAEP scale)	0.000 ***	0.000	0.14	0.02	0.02	0.05	0.000 ***	0.000	0.20	-0.02	0.02	-0.05
Total district membership/1000	0.000	0.000	0.01	0.06 *	0.03	0.01	0.000	0.000	0.00	0.12 **	0.05	0.02
Per pupil expenditures/1000	0.000	0.000	0.002	-0.02	0.02	-0.004	0.000	0.000	0.002	-0.02	0.04	-0.003
Percent Hispanic per grade	0.002	0.002	0.01	-0.40 **	0.13	-0.02	0.002	0.002	0.02	-0.34 *	0.15	-0.02
Percent Black per grade	-0.004	0.004	-0.02	0.06	0.23	0.002	-0.01	0.004	-0.02	0.13	0.26	0.003
Percent of students that are ELL	-0.001 **	0.000	-0.01	0.10	0.08	0.01	-0.001 ***	0.000	-0.01	0.07	0.12	0.004
Percent enrolled in charter schools	0.004 *	0.002	0.03	-0.07	0.10	-0.003	0.005 *	0.002	0.03	-0.11	0.13	-0.004
Percent enrolled in magnet schools	0.001	0.001	0.01	0.01	0.11	0.001	0.000	0.001	0.003	-0.02	0.14	-0.001
White-Hispanic segregation				-1.36	1.27	-0.01				8.03 ***	1.84	0.04
Residual Variance	0.001 ***	0.000	0.77	34.80 ***	1.09	0.96	0.001 ***	0.000	0.76	49.93 ***	3.33	0.97
<b>Indirect Effects</b>												
Charter school enrollment and white-Hispanic segregation				-0.01	0.01	0.000				0.04 *	0.02	0.001
Magnet school enrollment and white-Hispanic segregation				-0.001	0.001	0.000				0.003	0.004	0.000
R <sup>2</sup>	0.24 ***	0.01		0.04 ***	0.01		0.24 ***	0.01		0.03 ***	0.01	
<b>Fit Indices</b>												
Degrees of freedom	0.000						0.000					
Chi-Square	0.000						0.060 *					
Comparative Fit Index (CFI)	1.00						1.00					
Tucker-Lewis Index (TLI)	1.00						1.00					
Root Mean Square Error of Approximation (RMSEA)	0.000						0.000					
Standardized Root Mean Square Residual (SRMR)	0.000						0.000					

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$



**Figure 1. Standard Deviation Change of Test Score Gap per Ten Percent of Students in a District Enrolled in Charter and Magnet Schools**



† $p=.1$  \* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$

**Figure 2. Mean Difference from District Mean Standard Deviation Change in Test Score Gap per Ten Percent of Students in a District Enrolled in Charter and Magnet Schools**

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